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Improved Seat and Bunk Tent.

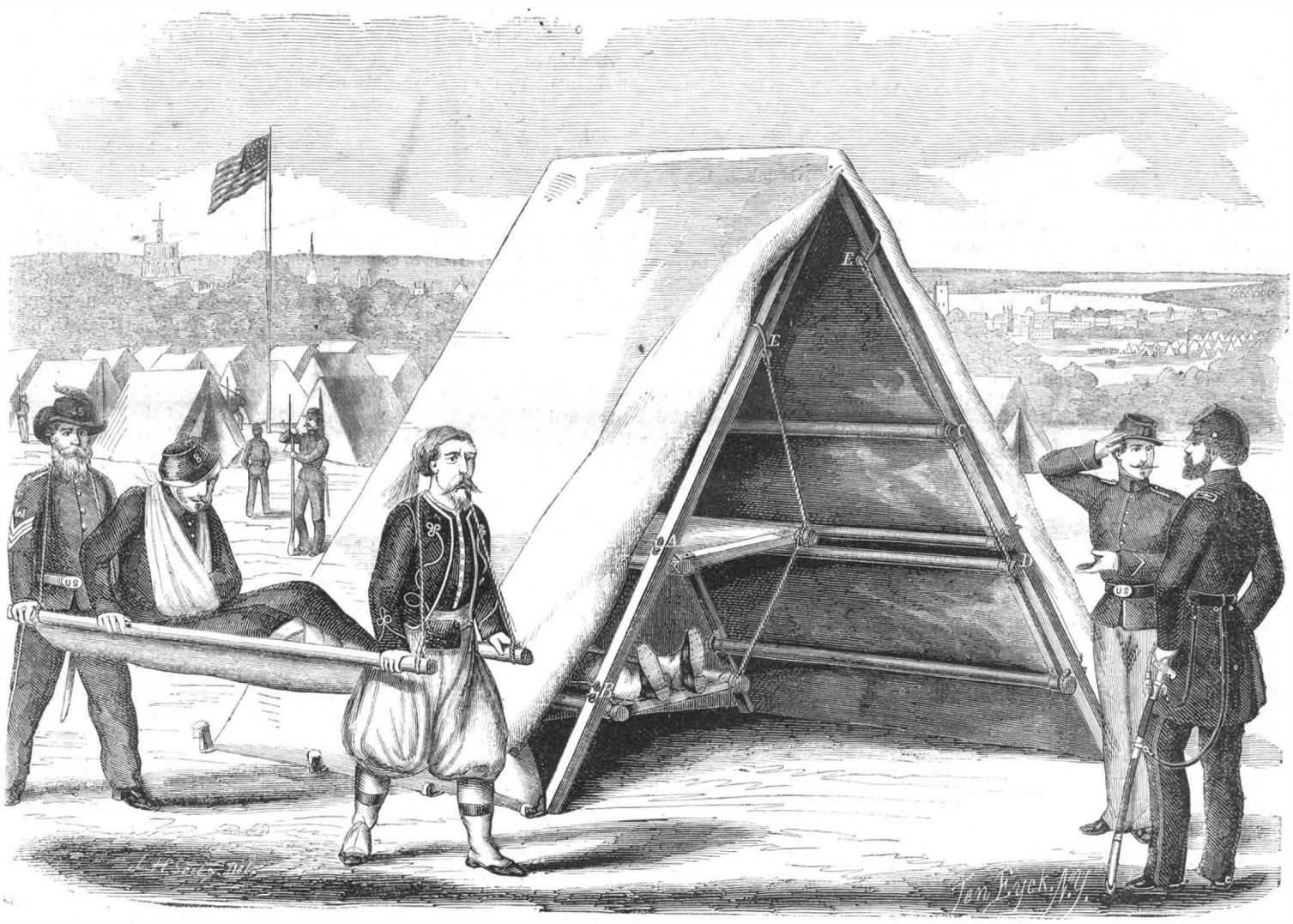
The great Napoleon, in his six months' campaign in Russia, lost by disease, hunger and cold one hundred and thirty-two thousand of his grand army. In the Crimean war, those who died from disease were eight times as many as those who fell in battle. A careful examination of history has shown that in armies the mortality of battle to the mortality of the camp is as five to eight. Such facts as these, no doubt, are startling to our hopeful soldiers, but the truth that there are greater perils to the soldier than those of the battle field, should be told and understood, otherwise there is little stimulus toward improvement. To our mind an invention which will save a hundred men is much more to be prized than any engine of destruction. Without doubt, the most fruitful source and excitant of camp diseases, is the common practice of sleeping on the cold ground. This proposition should need no argument or illustration. Sleep is as necessary as food, and we should be equally careful about the quality of each.

The tent illustrated in the engraving, and invented by Henry Garbanati, of Brooklyn, N. Y., is designed to furnish the soldier with one of the most useful comforts of home, viz., a good bed. The engraving needs but little description to make his plan quite plain. The frame work of the tent is a ridge pole, and its two pairs of supports. Over this frame work the canvas is stretched, and the tent appears like many of those in common use. The novelty of the invention is found in the interior, in the berths or bunks attached by hinge-joints to the supports. In the tent of the engraving four of these bunks are represented; the two at the right being drawn up and out of the way, and the two at the left as prepared for sleepers. The hinge joints are indicated by the letters, A B C D. E F are ring holdfasts, by which the cords, fastened to the outer corners of the berths and controling their position, are supported. The whole apparatus may be taken down or put up in a few minutes, and the berths may be wholly detached and used as litters, as is clearly shown at the left of the engraving. During the day, the bunks may be drawn up in the tents or used as seats, shelves or tables.

Mr. Garbanati also makes his tent of various sizes and forms. One of an octagonal shape is designed for sixteen men.

The only objection made to this tent is the very few pounds of excess of weight over the ordinary army tent, but Mr. Garbanati submits in answer that when his tent comes in use, that although a few pounds more of light thin strips and canvas are to be transported, there will be fewer of sick men to burden the wagons; no kind of luggage is so expensive and troublesome as the sick. A wagon one-half the weight of the army wagon will carry tents for a whole company. In our times of railroads, steamboats and turnpikes, army transportation is quite a different thing from the transportation which vexed the great Napoleon.

Mr. Garbanati may be addressed at No. 172 Centre street, New York.



GARBANATI'S SEAT AND BUNK TENT.

An electric spark of induction, produced by Ruhmkorff's great machine at Paris, has pierced through a plate of crown-glass nearly 2 inches thick, and another about 1¼ inches thick. These plates were recently laid before the Academy of Sciences, by M. Faye, who stated that such thick plates had never before been pierced by the spark of induction. The holes were fine, and of a somewhat spiral form. There was no trace of fusion or of metallic deposit; and M. Ruhmkorff added that an energetic compression of the substance of the glass appeared to have accompanied the passage of the spark.

The exports of copper ore, this year, from San Francisco, amounted to 1,629 tuns, of which 605 tuns were sent to Europe.

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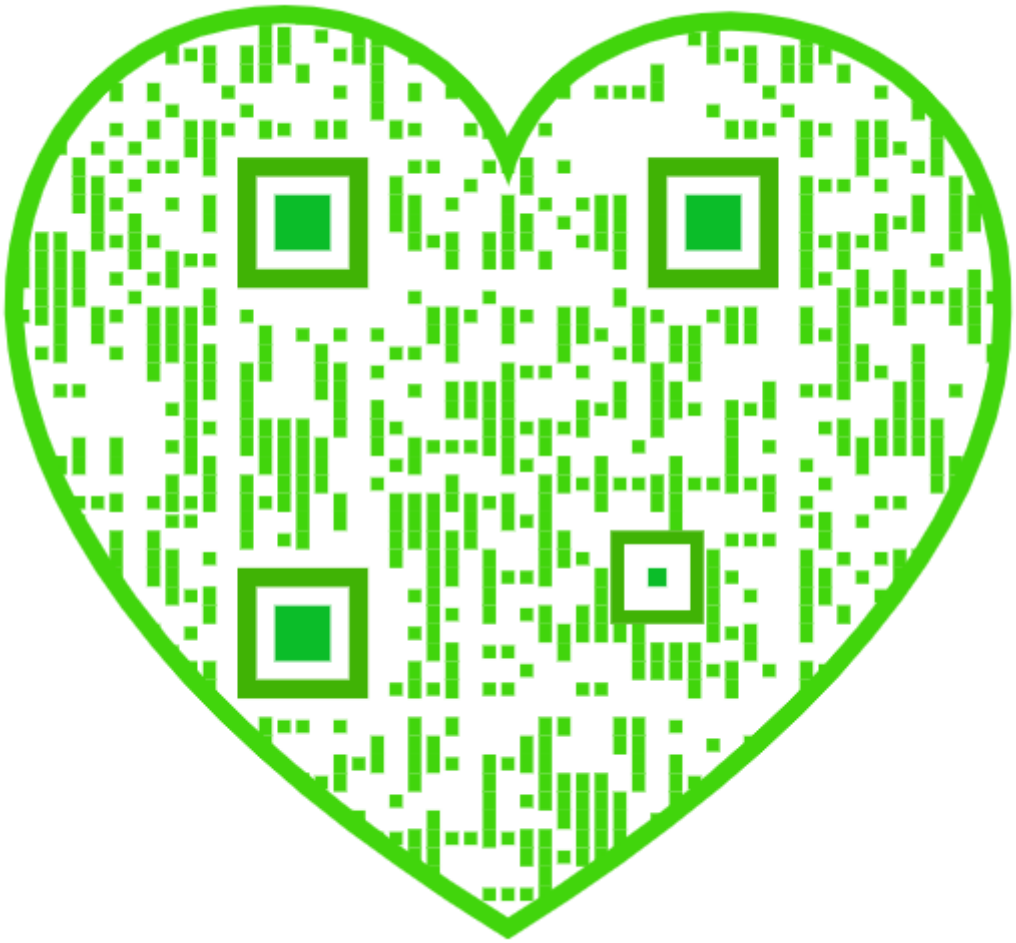

NOTES ON MILITARY AND NAVAL AFFAIRS.

MESSAGE AND REPORTS.

At the time of going to press we had carefully read the President's Message and the Reports of the Secretaries of the War and Navy Departments. The message is a plain, straight forward document. The President attempts no hyperbolical flights of fancy, and indulges in no severe language against those who are at war against the government, thus showing a splendid contrast to the recent Message of Jeff Davis. He treats all matters relating to the condition of the country in a calm and dignified manner, perfectly conscious of his sworn duty, and evidently determined to perform it at all hazards. Mr. Holt, in his famous speech to the people of Kentucky, declared that the President took no counsel of his fears, and was not afraid to look traitors square in the face. We presume all our readers either have or will read the Message, therefore we will make no extracts from it. We cannot forbear, however, to quote the closing passage, as characteristic of the calm determination of the President to push on the war against the rebellion. He says, "With a firm reliance on Providence, *all the more firm and earnest*, let us proceed in the great task which events have devolved upon us."

The report of the Secretary of War is an able State paper, and affords us a clear insight into the operations of the army. It appears that since the outbreak of the rebellion, 718,512 men have been in the service of the country. This large number includes the regular army of 16,000 men; also the three months' enlistments, which amounted to 77,875. The several arms of the service are estimated to comprise 660,971 men, a force, it would seem, equal to the great emergencies of the country. "We have here," says the Secretary, "an evidence of the wonderful strength of our institutions. Without conscriptions, levies, drafts, or other extraordinary expedients, we have raised a greater force than that which, gathered by Napoleon with the aid of all these appliances, was considered an evidence of his wonderful genius and energy, and of the military spirit of the French nation. Here every man has an interest in the government, and rushes to its defence when dangers beset it."

The report of the Secretary of the Navy is a creditable document. He details the great and varied labors which devolved upon him at the outset in preparing for all the emergencies that pressed upon this department. Our navy, on the 4th of March last, consisted of 42 vessels, of all classes, carrying 555 guns, and about 7,600 men. We have now a navy of 264 vessels, manned by about 22,000 seamen. All this increase has been accomplished during the past eight months.

The Secretary speaks in terms of commendation of the gallantry of the navy in the taking of Hatteras and Port Royal.

On the whole the message and reports are excellent State papers, and will inspire a renewed confidence in the government and a determination to sustain it. We present elsewhere some short extracts from these reports which embody useful information.

MISCELLANEOUS.

The Hon. Mr. Wickliffe, of Kentucky (a glorious man, we would like to shake his honest, loyal hand), declared in the House of Representatives on the 3rd inst. that, "with the blessing of God and the stout hearts of the people, not a hostile foot of a rebel will be found treading the soil of Kentucky after the 20th of December."

In the instructions which Mr. Toombs, as Secretary of State, gave the privateers, we find the following passage: "Neutral vessels conveying enemies' despatches or military persons in the service of the enemy forfeit their neutral character, and are liable to capture and condemnation." If we had applied this general rule to the *Trent* she would have been lying in one of our harbors as a prize. Thus are the Confederates condemned out of their own mouths.

The Confederate steamer *Nashville*, while on passage to England, fell in with the American ship *Harvey Birch*, Capt. Nelson, bound from Havre to New York, in ballast. Commander Pegram, of the *Nashville*, took Capt. Nelson, had his crew put in irons, then set fire to the ship, and burned her to the water's edge. It is also reported that a large steamer had left London with munitions of war for the Southern States.

One of the most serious obstacles in the way of our government making a successful demonstration at the outset against the rebellion was a want of arms; this was a serious and alarming difficulty, and those who complained because a half million men were not at once called into the field knew little of what they were talking about. Floyd, while Secretary of War, had so thoroughly cleaned out the northern arsenals that scarce anything was left in the shape of a decent gun to put into the hands of loyal troops. The destruction, also, of the Harper's Ferry arsenal was another disaster at the wrong time, whereby the power of the government to make its own arms was greatly diminished. We are now out of the woods on this important point, and hereafter no trouble will be felt for want of good arms. It is stated that the efficiency of the Springfield armory has been so largely increased that it is now capable of turning out 10,000 stand of arms each month. While the Secretary of War was on a visit to the Chicopee works, not long since, he found that a large quantity of machinery for the manufacture of muskets had been completed for private parties. Believing that in the exercise of the war power he had the right to bring to the aid of the country every facility which it might require, he at once directed the manufacturer to hand the machinery over to the superintendent of the Springfield arsenal, and to draw upon the government for compensation at the price at which he had contracted to furnish it to the private establishments. By the purchase of this large quantity of machinery already finished, which, when put in operation, will enable this establishment to produce during the next year 200,000 stand of the justly celebrated Springfield rifles.

Letters recently received from London state that the British government refuses to grant clearances from English ports to vessels having on board arms for the United States. This is only carrying out more strictly than heretofore the Queen's proclamation of neutrality, which forbade the shipment of all articles contraband of war to "either of the belligerents."

The steamship *Fulton*, which arrived in this port Nov. 27, brought 30,000 stand of arms to the government. Thirteen rifled cannon arrived the same day from the Cold Spring Foundry, opposite West Point, including a 100 pounder, which will carry five miles. The latter will be sent to Fortress Monroe.

It is not at all probable that the main army will go into winter quarters as some suppose. If it was the intention of Gen. McClellan to take such a step he would not continue to reënforce the army of the Potomac. He has men enough there now, and can sustain regiments much cheaper in other parts of the country. The reader of history will call to mind many great battles fought in winter. The capitulation of Mantua took place in the month of February, 1797. The terrible battle of Austerlitz was fought December 2, 1805. Eylau was fought on the 8th of February, 1807, on a snow-covered field. Rivoli was fought in January; Breslau stormed in that month; Ciudad Roderigo besieged in the same month; and numerous less important actions fill the history of European campaigns in winter. In our own history, Trenton, New Orleans, Frenchtown and Ogdensburg were winter battles.

The Ohio troops at Cheat Mountain, Virginia, have gone into winter quarters of their own construction. A letter from the camp describes the difficulties encountered by the soldiers in constructing one hundred log cabins: "The only tools, with the exception of axes, employed in the building of this mountain city, were one 'secesh' auger, one ditto adze, one ditto drawknife, and with this meager supply four thousand men have to work. The greater part of our lumber had to be brought from a distance of half a mile, and that upon the backs of the men. It is a novel as well as a pitiable sight to see from twenty to twenty-five men staggering along beneath a huge pine, and fairly dropping, when they arrive, from pure exaustion. The chimneys are all substantial stone structures, while the buildings are neatly roofed, and 'chunked and daubed' thoroughly."

General Sumner, who has recently returned from California, is placed in command of a new division, to be located between those of Heintzleman and Blenker and is a great acquisition to the force southwest of Alexandria. General Sumner is a very capable officer and of undoubted loyalty.

Floyd (we won't dignify him with the title of general) in his recent retreat from the vicinity of Gauley, destroyed everything portable about Fairfax Court House. He burned over three hundred tents, and picks, spades and axes by the hundred were found charred and destroyed. At another place ten wagon loads of ammunition were captured, and along the road for many miles blankets, broken down wagons, tents and other articles of camp equipage, including arms, were found cast aside in his hurry to get out of the way of Benham's men. The victory was complete, and although Floyd was not bagged, he was driven ingloriously from Western Virginia. Floyd's force consisted of six Virginia regiments, two Mississippi regiments and one Georgia regiment, in all about five thousand five hundred men. Gen. Benham had the Tenth, Twelfth, Thirteenth, and five hundred men from each of the Thirty-seventh and Forty-fourth Ohio regiments, in all three thousand two hundred men. The boys returned to camp in high glee, and now demand to be sent to Kentucky or the Potomac, where they can find something to fight. It is somewhat singular that with but two exceptions, in every success we have had in Western Virginia our men have been led by Gen. Benham.

It is thought that the present Congress will make a large requisition for additional troops—two hundred thousand at least. The right theory is, no doubt, to call out an immense force at the earliest moment possible, and thus make the war sharp, short and decisive. General McClellan says this cannot be a long war.

The following named officers have been appointed to regulate and fix the number and caliber of the cannon to be mounted in the casemates and *en barbette* at each of the permanent fortifications of the United States, and also the number and description of guns to compose field pieces:—Brigadier General Totten, Corps of Engineers; Brigadier Gen. Ripley, Ordnance Department; Brigadier Gen. Barry, U. S. V.; Brigadier Gen. Barnard, U. S. V.; Col. Hunt, U. S. A.; and Capt. Rodman, Ordnance Department.

The Navy Department has received official information from Commodore Dupont of the occupation of Tybee island, at the mouth of the Savannah river, by Union troops. The occupation of this point places that river entirely under Federal authority. Fort Pulaski is only five hundred yards from the mouth of Tybee island, now occupied by our troops. The Federal flag now floats on the soil of every seceded State except Arkansas and Alabama. It waves in Texas, opposite El Paso; on Ship island, in Mississippi; at Pensacola, and Key West, in Florida; at the mouth of the Mississippi river, below New Orleans, in Louisiana; on the island of Tybee, in Georgia; at Port Royal and St. Helena, in South Carolina; at Elizabethtown and Bristol, in Tennessee; over half of Virginia; over two-thirds of Missouri and Kentucky, and over all of Maryland and Delaware.

There was considerable discussion at the outset of the war as to the propriety of employing cavalry. Gen. Scott was opposed to it as an expensive and inefficient arm of the service. Gen. McClellan, an experienced cavalry officer, when he took command of the army of the Potomac, ordered a large increase of artillery, declaring that this would be an artillery war. Somebody is responsible for having saddled upon the government a large army of raw mounted troops, and it is said that the War Department is now satisfied that Gen. Scott was right in his objection to their introduction.

At the siege of Sebastopol there were 252,000 rounds of cannon ammunition expended. There were 100 mortars and 266 guns of various sizes used in that siege, and of the whole number only 41 remained serviceable after the fall of Sebastopol.

Mr. Whitworth has addressed a letter to the *Times*, in which he contradicts the statement that in recent experiments his guns had failed to answer his expectations. He has been perfectly satisfied with the result of every experiment hitherto made, and he promises, should his health be restored, to prove "beyond all question," the soundness of the principle upon which he proceeds in the construction of rifled small arms and rifled ordnance.

Senator Sherman of Ohio, it is said, will bring in a bill to reduce the civil expenses of government, and Senator Wilson has in contemplation a bill to abolish regimental sutlers.

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Com. Stringham, Professor Joseph Henry, of the Smithsonian Institute, and other eminent gentlemen, have been appointed by the government to examine and report upon the Stevens floating battery. They are now daily engaged in the inspection and practical testing of the invention. The future course of the government with reference to it will be determined by their report. A large number of workmen continue to be employed upon the battery.

The following are the current prices of merchandise at wholesale in Richmond (the *Examiner* remarking that for small quantities higher prices are charged), viz., bacon, hog round, 23 to 26 cents; butter, 45 to 50 cents, very scarce, Cornmeal, 80 to 85 cents; candles, tallow, 20 cents; adamantine, 45 to 49 cents. Coffee, none in the market. Hay, timothy, or clover, $2.35 per hundred. Halifax herrings, $8 to $10, but none to be had. Pig iron, $40 to $45, stock small. Nails, 7 to 7½ cents. Refined English iron, $115 to $220. Leather, 60 to 65 cents, demand immense, stock very light. Lead, 7½ to 7¾ cents. New Orleans molasses, 52 to 65 cents. Pepper, 70 to 75 cents, very scarce. Salt, fine Liverpool, $9.50 to $10. Wool, washed Virginia (common), 50 to 60 cents; fine merino (common), 55 to 60 cents.

Jeff. Davis, in his late message, says that the blockade is totally inefficient, and proposes to invoke the aid of European nations in breaking it up. On the other hand, Mr. Yancey, in his speech to the fishmongers at London, says that the Confederate States, "though cut off by blockade from all foreign trade, have been able—from their internal resources alone—to equip and maintain in the field an army of over 250,000 troops.

Among the subjects to be brought to the early attention of Congress is the business carried on by sutlers. The various privileges allowed to many of these men, is abused in various ways, and the soldiers are shamefully swindled. A man who will take advantage of his privileges as sutler, to cheat a soldier in times like these would betray his government, and ought to be shut up in Fort Warren.

Between the 1st of July and the 1st of November—four months—ten million of cartridges for muskets and small arms were issued by the Ordnance Department to the army of the Potomac. This enormous expenditure of cartridges is due to target practice among our troops.

Spencer's new repeating breech-loading rifle was recently tried by a board of army officers, by order of General McClellan. They made a satisfactory report, and recommend its introduction into the service. An order for a supply had previously been issued by the Navy Department. This rifle is self-charging from a magazine of cartridges within the stock, though it may be loaded at the breech by hand, and used as an ordinary breech loading gun. Its novelty consists in the construction and mode of locking the breech which renders it very tight, secure and safe, also in the means employed to withdraw the discharged cartridge cases from the barrel, and to conduct new cartridges into it from the magazine.

Privateering under Jeff Davis's letters of marque, seems not to flourish very extensively. We have intelligence of the recent capture of the *Beauregard* and the *Royal Yacht*, by Federal vessels.

INTERNATIONAL EXHIBITION AGENCY.—In our journal of the 23d ult., we published the card of Messrs. Morgan Brothers, Bow-lane, London, setting forth the advantages offered by their international agency, to all who proposed to exhibit in the London exhibition. We intended to have stated at that time that this firm is a reliable one and will energetically carry out its promises.

THE latest invention of which we have heard is a chewing machine—in other words, a little mill intended for toothless people and those who cannot properly masticate their food. Such an article is advertised in the London *Lancet*. It is fastened to the dinner table, goes with a crank, and is said to mince the food very nicely.

PATENT OFFICE RECEIPTS.—The President in his message, says:—The receipts of the Patent Office have declined in nine months about $100,000, rendering a large reduction of the employed necessary to make it self-sustaining.

Extracts from the Secretaries' Reports.

The Secretary of the Navy in speaking of the blockade, remarks that one method of blockading the ports of the insurgent States, and interdicting communication as well as to prevent the egress of privateers which sought to depredate on our commerce, has been that of sinking in the channels, vessels laden with stone. The first movement in this direction was on the North Carolina coast, where there are numerous inlets to Albemarle and Pamlico Sounds, and other interior waters, which afforded facilities for eluding the blockake, and also to the privateers. For this purpose a class of small vessels were purchased in Baltimore, some of which have been placed in Ocracoke inlet.

Another and larger description of vessels were bought in the eastern market, most of them such as were formerly employed in the whale fisheries. These were sent to obstruct the channels of Charleston harbor and the Savannah River., and this, if effectually done, will prove the most economical and satisfactory method of interdicting commerce at those points.

Since the institution of the blockade one hundred and fifty-three vessels have been captured sailing under various flags most of which were attempting to violate the blockade. With few exceptions, these vessels were in such condition when seized, as to authorize their being sent at once to the courts for adjudication and condemnation.

CONSTRUCTION OF NEW VESSELS.

Most of the public armed vessels being of such size and draught of water that they could render only important blockading service, immediate measures were taken to carry into effect the policy of the government in advance of the special session of Congress by contracting for the construction of twenty-three steamers which should be of light draught, but heavy armament. Congress at the regular session, had authorized the building of seven screw steamers, and as there were four yards, in each of which two might be built, the Department in the existing emergency, and in anticipation of the action of Congreas when it should convene, directed the construction of eight, dividing them into two classes of about one thousand and fourteen hundred tuns respectively. At the special session, Congress not only sanctioned the action of the Department in the construction of these thirty-one steamers, but it authorized the further construction of twelve side-wheel steamers of light draught, and of six of larger capacity to be modeled and built specially for speed. Many of those first ordered are already in commission, and the others are in rapid progress toward completion. If, with those above enumerated, we include three iron-clad, or armor steamers' which are being built from the money appropriated for that purpose at the special session, there will be under these several arrangements, an addition when they are completed, of fifty-two new steamers, peculiarly adapted to the required blockade or coast-guard duty, added to the navy. No sailing vessels have been ordered to be built, for steam, as well as heavy ordnance, has become an indispensable element of the most efficient naval power.

ARMORED SHIPS.

To carry into effect the provisions of the Act approved Aug. 3, 1861, providing for the construction of one or more armored ships and floating batteries, I appointed Commodores Joseph Smith, and Hiram Paulding, and Captain Charles H. Davis, skillful and experienced naval officers, to investigate the plans and specifications that might be submitted. The subject of iron armature for ships is one of great general interest, not only to the navy and country, but is engaging the attention of the maritime powers of the world. Under the appropriation made by Congress, the Department, on the favorable report of the Board has contracted for the construction of three iron clad ships of different models, the aggregate cost of which will be within the limits of the appropriation. The difficulty of combining the two qualities of light draught and iron armor, both of which are wanted for service on our coast could not be entirely overcome; but the Board in this new branch of naval architecture has, I think, displayed great practical wisdom, and I refer to their very full and able report which is appended, for a more explicit and detailed exhibit of their inquiries and conclusions.

ESTIMATES AND APPROPRIATIONS.

The amount appropriated at the last session of Congress for the naval service for the current year, was $13,168,675 86. To this was added at the special session in July last, $30,446,875 91—making for the fiscal year ending June 30, 1862, an aggregate of $43,615,551 77. This sum will not be sufficient, however, for the purpose, and therefore additional appropriations will be necessary. There will be required to pay for vessels purchased, and for necessary alterations incurred in fitting them for naval purposes, the sum of $2,530,000; for the purchase of additional vessels, $2,000,000; and for the construction and completion of twenty iron-clad vessels, $12,000,000—making a total of $16,530,000.

STRENGTH OF THE ARMY.

The Secretary of War furnishes the following statement, which shows the strength of the army:—

	VOLUNTEERS.		
States.	*3 months.*	*For the war.*	*Aggregate.*
California	....	4,688	4,688
Connecticut	2,236	12,400	14,636
Delaware	775	2,000	2,775
Illinois	4,941	80,000	84,941
Indiana	4,686	57,332	62,018
Iowa	968	19,800	20,768
Kentucky	....	15,000	15,000
Maine	768	14,239	15,007
Maryland	....	7,000	7,000
Massachusetts	3,435	26,760	30,195
Michigan	781	28,550	29,331
Minnesota	....	4.160	4,160
Missouri	9,356	22,130	31,486
New Hampshire	779	9,600	10,379
New Jersey	3,068	9,342	12,410
New York	10,183	100,200	110,388
Ohio	10,236	81,205	91,441
Pennsylvania	19,199	94,760	113,959
Rhode Island	1,285	5,898	7,183
Vermont	780	8,000	8,780
Virginia	779	12,000	12,779
Wisconsin	792	14,153	14,945
Kansas	....	5,000	5,000
Colorado	....	1,000	1,000
Nebraska	....	2,500	2,500
Nevada	....	1,000	1,000
New Mexico	....	1,000	1,000
District of Columbia	2,823	1,000	3,823
Total	77,875	640,637	718,512
Estimated strength of the regular army, including new enlistments under act of Congress of July 29, 1861.	....	20,334	....
Total	....	660,971	....

The several arms of the service are estimated as follows:—

	Volunteers.	*Regulars.*	*Agg'te.*
Infantry	557,208	11,175	568,383
Cavalry	54,654	4,744	59,398
Artillery	20,380	4,308	24,688
Rifles and sharpshooters	8,395	....	8,395
Engineers	....	107	107
Total	640,637	20,334	660,971

TELEGRAPH.

Under an appropriation granted for that purpose at the last session of Congress, a Telegraphic Bureau was established, and has been found of the greatest service in our military operations. Eight hundred and fifty-seven miles of telegraphic line have been already built and put in operation, with an efficient corps of operators, and a large extension is now in process of construction.

FRONTIER DEFENCES.

It is of great importance that immediate attention should be given to the condition of our fortifications upon the seaboard and the Lakes, and upon our exposed frontiers. They should at once be placed in perfect condition for successful defence. Aggressions are seldom made upon a nation ever ready to defend its honor and to repel insults; and we should show to the world, that while engaged in quelling disturbances at home, we are able to protect ourselves against attacks from abroad.

MILITARY ACADEMY.

I earnestly recommend that immediate provision be made for increasing the corps of cadets to the greatest capacity of the Military Academy. There are now only 192 cadets at that important institution. I am assured by the Superintendent that 400 can at present be accommodated, and that, with very trifling additional expense, this number may be increased to five hundred. It is not necessary, at this late day, to speak of the value of educated soldiers. While, in the time of war or rebellion, we must ever depend mainly upon our militia and volunteers, we shall always need thoroughly trained officers. Two classes having been graduated during the present year, in order that the service might have the benefit of their military education, I had hoped that Congress, at its extra session, would authorize an increase of the number. Having failed to do so, I trust that at the ap-

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proaching session, an increase will be authorized, and that the selection of cadets will be limited exclusively to those States which, coöperating cordially with the government, have brought their forces into the field to aid in the maintenance of its authority.

French Purple.

[Translated from Dingler's Polytechnic Journal.]

Pourpre française, or French purple, is the name given by Messrs. Quinon, Marras & Bonnet, the well-known silk dyers in Lyons, France, to a violet pigment produced by them from lichens, such as *Lecanora tartarea*, *Rocella tinctoria*, &c. This pigment, in accordance with its origin and nature, closely resembles the dye known as litmus or orchil. It differs materially from it, however, in two particulars; first, by its much greater ability to be fixed on fabrics, particularly silk and wool, without the use of mordants, and to produce a genuine and durable color; and second, from the fact that its violet hue is changed to red only by pretty strong acids, whereas orchil turns red by the action of weak acids.

The process of manufacturing this dye comprises, first, the preparation of the material from which the dye is obtained and which is composed principally of lecanoric, erythric and orsellesic acid, &c.; second, the conversion of this material into dye by the action of ammonia, air and heat; and, third, the preparation of the dye in a solid state.

The several acids of the lichens can be extracted by means of alcohol, hot acetic acid, a mixture of alcohol and ammonia, or any other alkali. If ammonia is used, it is diluted with four or five times its volume of water, and a systematic extraction is effected by exposing parcels of the lichens which have already been extracted, to a greater or smaller extent, and finally, fresh lichens to the action of the same quantity of liquid ammonia, whereby the liquid is completely saturated with acid. The extract is afterward mixed with a surplus of sulphuric or muriatic acid, whereby the acids of the lichens are precipitated, and then collected on a filter and carefully washed and dried. The acids of the lichens can also be extracted by heating the plants with milk of lime and precipitating them with muriatic acid; or the lichens may be boiled in dilute sulphuric acid and afterward washed with water. In this case the acids remain in combination with the woody parts of the lichens.

The precipitate obtained by either one of the above methods is now mixed with sufficient ammonia to dissolve it, and this mixture is boiled, whereby a liquid is obtained the color of which soon turns to an orange, and which, if exposed to the atmospheric air at a temperature of from 60° to 70°, soon changes in the desired manner by assuming different colors, one after the other, until at last it becomes a bright red. While in this condition the liquid is put into flat vessels and gradually heated to from 120° to 140°. After a few days the liquid assumes a purple violet color, and is not affected by weak acids, and it will dye silk and wool without the aid of other substances; it can also be easily fixed on cotton by suitable mordants. If, instead of the acids, the lichens themselves, purified by being treated with diluted acid, are employed, the proceeding is substantially the same until the red color is formed, and after this the liquid is separated from the fibrous parts by the aid of a press.

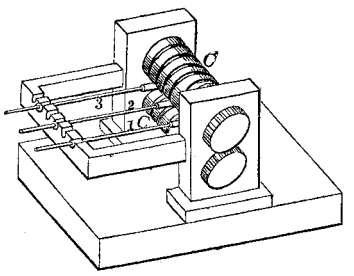
As soon as the acids of the lichens have been converted into the dye, the liquids from which the acids have been obtained are mixed together and saturated with sulphuric or some other acid. By this operation a copious precipitate is obtained which is collected on a filter and carefully washed and dried.

Instead of precipitating the red ammoniac liquid with sulphuric acid, as stated above, chloride of calcium may be used, whereby a precipitate is obtained having the appearance of indigo with a violet color. In this condition it is brought to the market.

[We have had a small sample of this substance in our possession for about two years. It was brought over here by a French chemist who endeavored to introduce it among our dyers. The color is a deep rich purple, somewhat resembling the section of a cube of Bengal indigo, when rubbed with the finger-nail. Its use, we understand, has lately been almost superseded in France by new aniline colors.—Eds.

ROLLING GUN BARRELS.

The accompanying figure illustrates an improved method of rolling gun barrels and drawing them with a taper over graduated mandrels. C C represent two grooved rollers placed one above the other, and 1 2 3 are graduated mandrels passing between the rollers in the grooves. Three short cylinders of heated iron to be rolled into gun barrels are placed upon the mandrels, and the rollers draw down these cylinders by several passes between them into barrels of the requisite size and form. By this operation the barrels are not only reduced in diameter and in the size of



the bore, but they are tapered externally at the same time, and rolled into the perfect shape of the army service musket without receiving the stroke of a hammer.

The inventor of this improvement is James Henry Burton, formerly of Harper's Ferry Armory, also Superintendent at the Enfield Armory, England, and who is now said to be in the service of the secessionists, at Richmond, Va. Patented March 20, 1860.

How to Select Mushrooms.

In consequence of the death of five officers, caused by eating poisonous *fungi*, the French Army Board have had the following instructions published:—

Fungi afford man an agreeable and nourishing food and therefore in some provinces of France, they are consumed to a great extent. The soldiers seek them, but unfortunately they often confound the poisonous with edible ones, and thus expose themselves to the gravest accidents. It is important, therefere, that they should be taught, as far as science is able, to distinguish the wholesome from the injurious species, and at the same time be made acquainted with the proper means to combat the poison. It is with this view that the Board of Health have drawn out the present instruction. Edible fungi grow usually in elevated and airy places in waste ground; whilst the dangerous species are found in woods, and in dark damp places. The edible species have a compact, brittle flesh; while those with a soft and watery flesh should always be rejected.

Wholesome fungi have an agreeable odor, although this character is also found in some injurious species. A powerful and disagreeable odor is the certain indication of noxious qualities.

We ought at once to reject fungi which secrete a milky juice, and those which present an acrid, astringent, bitter acid or salt taste.

We should suspect fungi which have a bright tint, red, green, or blue, of which the gills are colored brown or blue. The flesh of the edible species is in general white; nevertheless, a beautiful red fungus, the *orange agarie*, is considered as the finest and most delicate species. Wholesome fungi do not change color by contact with the air after being cut; those of which the flesh then acquires a brown, green, or blue tint, are poisonous. We ought to regard as dangerous those which insects will not touch.

It is proper to abstain from fungi, whatever may be their apparent qualities, when they exhibit any signs of change; when even they have been collected more than twenty four hours—the poisonous properties being capable of development when the fungus dries up.

Cure for Toothache.—A patent has just been taken out in England, by M. A. Prenslan for curing toothache by what he terms "oil paper liquid." This is obtained by submitting paper to destructive distillation in a retort. The liquid comes over, and is condensed in the worm of the still, and then applied to the tooth with a pellet of cotton. The liquid thus obtained is nothing more than *creosote*, which is now used by many persons for allaying the pain of ulcerated teeth. Crude coal oil possesses the same properties, and may be used for the same purpose.

Action of Poison on Wild Animals.

The following is from B. R. Ross, in the *Canadian Naturalist*:—For the purpose of poisoning them strychnia is used. I have tried aconitine, atropine, and corrosive sublimate without success. The two former may not have been pure enough, though I obtained them from the first chemical works in England and at a very high price. The only poison that I have found strong is strychnia. One or two grains of this are mixed with a little tallow, forming a small ball, and covered with a coating of grease outside to prevent the animal from tasting it. A quantity of pounded dried meat and morsels are strewn about so that the animal after swallowing the poison may be detained a sufficient time for it to operate. The distances which animals go before they die vary greatly; in some instances they fall directly in others they run several miles with the same dose, and arranged in like manner. This I attribute to several causes; to their fatness, and to the quantity of food in their stomachs, as lean and hungry foxes die much more quickly than others. The medium in which the poison is given also causes a great difference. When put up in fresh meat a very long time elapses before it operates. Wishing to preserve a specimen of the Hare-Indian dog for the Smithsonian Institution, I resolved to kill the animal by poisoning. Two grains of strychnia of the first strength were administered in a piece of fresh meat; at the end of two hours the animal was as well as ever. I then administered one grain more mixed with grease, in two minutes the spasms began, and in five the animal was dead. The first symptoms were a restlessness and contraction of the pupil of the eye, and a flow of saliva from the mouth, violent cramps then ensued, the head shook violently, like a paralytic person, the legs were drawn up and the spine took a circular shape, a lull of a few seconds then ensued, when after an attack of great violence the animal died. On dissection the blood vessels of the head and neck were found very full of black and clotted blood, such as I have seen in the jugular vein of a person who had died of apoplexy. There was no inflammation of the stomach, and the fatal bait was found in the throat entire. Once seen, the symptoms of poisoning by strychnia are easly recognized, and I would be certain now of passing a correct opinion on a case of the kind. Dogs take a longer time to expire than either wolves or foxes; the latter dying most quickly; in fact according to the ratio of the wild nature of the animal who eats it will be the quickness and violence of its death.

Counterfeiting Rare Coins and Medals.

The Philadelphia *Press* states that "it has recently been discovered that numerous persons are engaged in the business of counterfeiting old and rare coins and medals, which are highly prized and sell at enormous prices. The coins are so accurately executed that it requires the best of judges to distinguish them from the genuine. A case has come to our notice, where a maufacturer of these relics realized over $15,000 at an expense of about $200. The subject has lately been brought before the Numismatic Society, of this city—a society for the collection and preservation of old coins and medals—and they have determined to denounce all persons who make, issue, or deal in such counterfeit pieces, and to use all legally proper efforts to expose them, and prevent the continuance of this fraudulent usage."

Counterfeiters either alter known coins, or strike new ones, or split the old specimens, and rejoin the halves which do not belong to each other. American colonial coins, and rare pieces, are manufactured very skillfully in New York, and nothing is more common than to find rare dates on coins carefully altered from common years. The electrotype process, of course, is a great aid in this species of fraud. The prices of coins and medals have varied, as the taste of collectors has been directed more toward one or another series or class. Very rare ancient gold and silver pieces have been sold by auction for prices as high as $1,500, when the intrinsic value of the metal was about $100. The Washington half dollars of 1792 have been sold for $57, and the same piece in copper for $64. Cents of 1793 and 1799 have been sold for $10 and $15, and half dollars of 1796 and 1797 for $25. Collectors generally prize fine and uncirculated pieces, even of common dates, at higher rates than poor pieces of rare dates.

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CHEMISTRY OF IRON.

Number VII.

SULPHURIC ACID AND IRON.

Copperas or green vitriol is a substance very well known. It is composed of sulphuric acid, iron and water. Sulphuric acid combines with iron in two proportions, and as this substance which we are considering has the first or smallest quantity of the acid, it is called the protosulphate, from the Greek, *protos*, first. The atom of the protosulphate of iron is formed by the combination of one atom of the protoxide of iron, Fe O, with one atom of sulphuric acid, SO_3, and seven atoms of water, HO. Consequently the formula is Fe O, $SO_3 + 7$ HO.

When green vitriol is heated it is decomposed, the water first passing off, and, at a higher temperature—a red heat—the sulphuric acid. Sulphuric acid was formerly made in this way, and was consequently called the oil of vitriol.

The protosulphate of iron may be made by dissolving iron filings in sulphuric acid, filtering and evaporating the solution, and setting it aside to crystallize. The crystals are sea green, transparent rhomboidal prisms, and have a strong inky taste.

The copperas of commerce is usually made from iron pyrites. When the bisulphide of iron is heated, its sulphur combines with the oxygen of the air and converts the sulphide of iron into the sulphate. That is to say, it becomes a combination of iron with sulphuric acid instead of with sulphur. Strictly speaking, the bisulphide of iron is converted into the protosulphate, which is copperas.

Copperas is very soluble in water. One pound of it will dissolve in two pounds of cold, or in three-fourths of a pound of hot water. It is extensively used in the arts; being employed for dyeing black, especially for hats; in making ink; in calico printing, and in many chemical and medicinal preparations. It usually becomes reddish when exposed to moist air; from which fact the French called it *couperose*, red, and this name has been corrupted in English to copperas.

HARDENING AND TEMPERING TOOLS AND METALS.

Number II.

Anvils and various kinds of steel dies are hardened by raising them to a low red heat, then placing them in a position with the face slightly sloping and permitting a stream of cold water to fall from an elevation upon them. When the water strikes the heated surface, it darts off at once and the metal is thereby cooled with a very hard surface, and yet it is not so liable to crack as by plunging it entire into a bath of cold water. It is scarcely possible to cool a thick piece of steel, like a die, a roller or an anvil, without cracking it if it is raised above a red heat and plunged into cold water. Such articles do not require to be tempered if properly treated in the hardening operation.

Turners' and carpenters' chisels, gouges and various tools for working in wood, are generally heated in an open clear fire, and moved backward and forward to heat them uniformly. When red hot they are plunged vertically in cold water. Some toolmakers use salt brine as the hardening liquid, others consider cold water just as good.

Very small drills are hardened by first heating them in the flame of a lamp, then whisking them rapidly through the air to cool, or dipping them into a dish containing oil.

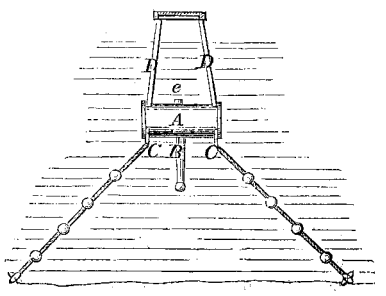
Files are hardened by first holding them in an iron vessel containing molten lead until they become red hot, then plunging them into cold salt brine. Various tools are hardened and tempered by taking each from the fire when red hot and dipping it, edge first, into cold water to a certain depth above the point. It is then lifted and held up for a second until the heat is conducted from the thicker part, which has not been cooled, down to the edge. When it assumes the blue or the straw color desired, it is plunged again into the water and cooled. Laborers' picks, hatchets, cold chisels, sculptors' chisels, &c., are hardened and tempered thus by blacksmiths. To prevent scale forming on the surface of tools while in the fire, they are covered with a paste composed of salt, charcoal and flour, which must be dried before the tools are highly heated.

In tempering knives, after they are hardened, they are laid with their backs downward upon a thick plate of heated iron or copper placed in a clear fire, and are allowed to remain upon it until they assume the proper color for the temper, when they are picked up with pliers and plunged into water.

A variety of opinions and practices prevail respecting the composition of tempering baths. A bath composed of one gallon of fish oil, one pound of beeswax, one pound of resin and two pounds of tallow, first heated and then mixed together, is employed for needles, fish hooks and some kinds of springs. Such a bath is also used for small saws. After being raised to a low red heat the saw is plunged into this bath then lifted out and partially wiped. It is then placed in a clear charcoal fire until the grease inflames, when it is cooled and thus tempered. Much experience is necessary to perform this operation, called "blazing off." In grinding and polishing several steel tools, such as saws, they are liable to lose elasticity. This is restored by careful heating and hammering. The separate parts of gun locks are fried in oil after being hardened. It is by this means that the thick and thin parts are all raised to an equal temperature and temper.

FLOATING BRIDGES.

In deep rivers and coast waters, where pillars and piers cannot be erected for building bridges or lighthouses, the accompanying figure illustrates a method by which such structures may be placed upon fixed floating foundations.



A represents a hollow cylinder or float, and any requisite number of such may be used to support a bridge or lighthouse. Each float has arms, C C, under it, to which chains and anchor weights are attached to hold the floats in position. B is a steadying rod, similar in its nature to the center board of a vessel. It is attached to and suspended directly under the float. D D are the uprights secured to the floating cylinders for the purpose of supporting trestle work and the superincumbent structure. There are valves, *e*, on the floats for pumping out water, should any find access. A series of such floats placed across a deep river will support a permanent bridge. Flying bridges for armies and the passage of heavy trains may also be constructed with rapidity in this manner. Patented by Thomas Schofield, of Grass Valley, California, March 20, 1860.

Aerial Navigation.

We find in the Smithsonian Report the following letter from Prof. Henry, of the Smithsonian Institution, to Mr. Lowe, the aeronaut, in relation to his projected crossing of the Atlantic in a balloon:—

DEAR SIR:—In reply to your letter of Febuary 25, requesting that I would give you my views in regard to the currents of the atmosphere and the possibility of an application of a knowledge of them to aerial navigation, I present you with the following statement, to be used as you may think fit.

I have never had faith in any of the plans proposed for navigating the atmosphere by artificial propulsion, or for steering a balloon in a direction different from that of the current in which the vehicle is floating.

The resistance to a current of air offered by several thousand feet of surface, is far too great to be overcome by any motive power at present known which can be applied by machinery of sufficient lightness.

The only method of aerial navigation, which in the present state of knowledge appears to afford any possibility of practical application, is that of sailing with the currents of the atmosphere. The question, therefore, occurs as to whether the aerial currents of the earth are of such a character that they can be rendered subservient to aerial locomotion.

In answering this question, I think I hazard little in asserting that the great currents of the atmosphere have been sufficiently studied, to enable us to say with certainty that they follow definite courses, and that they may be rendered subservient to aerial navigation, provided the balloon itself can be so improved as to render it a safe vehicle of locomotion.

It has been established by observations extending now over two hundred years, that at the surface of the earth, within the tropics, there is a belt along which the wind constantly blows from an easterly direction; and, from the combined meteorological observations made in different parts of the world within the last few years, that north of this belt, between the latitudes of 30° and 60°, around the whole earth the resultant wind is from a westerly direction.

The primary motive power which gives rise to these currents is the constant heating of the air in the equatorial, and the cooling of it in and toward the polar regions; the eastern and western deflections of these currents being due to the rotation of the earth on its axis.

The easterly current in the equatorial regions is always at the surface, and has long been known as the trade winds, while the current from the west is constantly flowing in the upper portion of the atmosphere, and only reaches the surface of the earth at intervals generally after the occurrence of a storm.

Although the wind, even at the surface, over the United States and around the whole earth between the same parallels, appears to be exceedingly fitful; yet when the average movement is accurately recorded for a number of years, it is found that a large resultant remains of a westerly current. This is well established by the fact that on an average of many years, packet ships sailing from New York to Great Britain occupy nearly double the time in returning that they do in going.

It has been fully established by continuous observations collected at this Institution for ten years, from every part of the United States, that, as a general rule, all the meteorological phenomena advance from west to east, and that the higher clouds always move eastwardly. We are, therefore, from abundant observation, as well as from theoretical considerations, enabled to state with confidence that on a given day, whatever may be the direction of the wind at the surface of the earth, a balloon elevated sufficiently high, would be carried easterly by the prevailing current in the upper or rather middle region of the atmosphere.

I do not hesitate, therefore, to say, that provided a balloon can be constructed of sufficient size, and of sufficient impermeability to gas, in order that it may maintain a high elevation for a sufficient length of time, it would be wafted across the Atlantic. I would not, however, advise that the first experiment of this character be made across the ocean, but that the feasibility of the project should be thoroughly tested, and experience accumulated by voyages over the interior of our continent. It is true that more eclat might be given to the enterprise, and more interest excited in the public mind generally, by the immediate attempt of a passage to Europe; but I do not think the sober sense of the more intelligent part of the community would be in favor of this plan; on the contrary, it would be considered a premature and foolhardy risk of life.

It is not in human sagacity to foresee, prior to experience, what simple occurence, or what neglect in an arrangement, may interfere with the result of an experiment; and therefore I think it will be impossible for you to secure the full confidence of those who are best able to render you assistance except by a practical demonstration, in the form of successful voyages from some of the interior cities of the continent to the seaboard.

JOSEPH HENRY.

NEBULÆ.—The Earl of Rosse has communicated to the Royal Society some observations on the nebulæ, with practical details on the construction of large telescopes. The principal result of the observations seems to be a large addition to the list of nebulæ with curved or spiral branches, and many new and multiple nebulæ. A variety of objects have also been pointed out, upon which, says the noble observer, the labor of a careful scrutiny with a similar instrument, even in this climate, will be amply repaid.

THE San Juan (Cal.) *Press* states that large deposits of manganese have been discovered near Nevada.

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Correspondence

The Old Red Sandstone of New York.

Hugh Miller has made the old red sandstone of Scotland classic ground for the geologist. His scientific sagacity, and his wonderful powers of description would be amply sufficient to commend to our interest any series of strata upon which they should be expended. It is therefore no marvel that his work should have proved so fascinating when it was directed to the exhuming of an unknown world—the fragments and wrecks of an ancient and unique creation. Many a student of geology owes his first interest in the science to the charm with which Hugh Miller has invested the old red sandstone.

The rock which bears the same name in the New York system has not heretofore sustained the reputation of its Scottish prototype. It was pronounced by the geologists of the State Survey, almost entirely destitute of fossils and the few which were found by them within the limits of the State, were plants mostly of a low grade, and one or two species of bivalve shells.

Their conclusion, however, that the rock contained but few and insignificant fossils, because such only had at that time been discovered, like many similar conclusions in geology, has proved unreliable. It has been known for several years that chambered shells, univalves and bivalves, in considerable variety also the teeth, plates and bones of shark-like fishes, occur abundantly in strata of this period, in the northern parts of Delaware county, New York, about the head-waters of the Susquehanna. Interesting specimens of these various forms from the town of Franklin, have been in the State Cabinet at Albany, for several years.

From some recent discoveries, however, there seems reason for believing that our own old red sandstone may approximate to the European rock in the variety and importance of its fossil contents.

Mr. J. M. Way, a very intelligent mechanic of Franklin, Delaware Co., N.Y., has lately found in that vicinity these fish remains in great abundance and perfection, and what is of more interest, a complete skeleton very closely resembling the Cephalaspis of Hugh Miller.

The importance of this discovery, together with that of the bone bed embracing both fish and reptilian remains, in Phœnixville, Pa., is manifest. The old red sandstone henceforth becomes highest in interest, as it is in geological position, of the strata of the New York system. EDWARD ORTON.

Chester, N. Y., Nov. 22, 1861.

Improvement in Warming Tents.

MESSRS. EDITORS :—I have received four copies of the SCIENTIFIC AMERICAN, and it seems like an old friend. As my subscription had just run out before I left home, and payday had just come, I was bound to have the paper if I did not have anything else. Our Lieutenant will hand me the paper and half a dozen will wish to see it at a time.

I noticed an article in the paper about a camp stove invented by a member of the Fifteenth Ohio Regiment. Our company have had them when on picket at Annapolis Junction. We dug our hole about three feet deep, laid the walls in morter, and made two trenches for smoke flues, so that, in whatever quarter the wind might be, it would not smoke the tent.

I have but two copies of your paper now. The rest are around among the Company and also in Company E. W. H. EARL.

Post Naval Academy, Annapolis, Nov. 25, 1861.

Schuylkill Canal and its Capacity.

MESSRS. EDITORS :—I notice in your issue of the 30th of November, under the head of "Comparative extent of the Canals in the United States," an error in relation to our canal which I think is deserving of correction. You give the Schuylkill canal as 36 feet wide, 3½ feet deep, locks 80 feet long, and 17 feet wide. The above was correct in 1840, but our canal has been enlarged, and now is 50 feet water surface, 6 feet depth of water, lock 110 feet long, and 18 feet wide ; canal 108 miles long. About one-half of the navigation is pools when the water surface runs from 200 to 400 feet wide, and depth from 7 to 20 feet. There was shipped over our navigation, of coal alone in 1860, 1,356,687 tuns, our boats are 102 feet long, 17 feet 6 inches wide, 8 feet high midships, and carry from 175 to 200 tuns according to age of boat, so you see we are not the small potatoes represented in the paragraph noticed. I find the same mistake has been made in the new Encyclopedia of Appleton, which I think is inexcusable in a work making the pretensions it does to being up to the times.

THOMAS P. KINSEY,
Supt. Mech'l Dept., S. N. Co.

Reading, Pa., Nov. 25, 1861.

[The statistics respecting canals referred to by our correspondent were obtained from a source supposed to be reliable.

An old correspondent in Auburn, N. Y., also sends corrective information respecting the New York and Erie Canal. Its present locks are 18 by 180 feet. They will admit boats 17½ feet beam, and 97 feet long, drawing 5 feet 6 inches of water. These locks are double with one exception, and the boats on this canal carry over 200 tuns of freight. Our correspondent regrets the locks were not made 150 feet long, as boats of 300 tuns could then be admitted that might have been propelled with steam engines at the rate of four miles per hour.—EDS.

The Crank Motion.

MESSRS. EDITORS :—Would it be any great advantage to do away with the crank motion of an engine, and substitute a different motion whereby the power of the engine would be the same throughout the revolution of the wheel, still retaining the present form of piston, &c. ? If so, I think I can accomplish such a change without any great additional expense in the first cost of an engine. E. P. F.

Saint John, N. B. Nov. 20.

[The crank motion is, in some respects, beautifully adapted to the reciprocating engine. It causes the piston to start at the beginning of the stroke with a slow motion, which is gradually accelerated to the middle of the stroke and then gradually diminished to the end. This avoids all blows and shocks, and is very important, indeed absolutely essential, in the rapid working of a reciprocating engine. There are serious objections to the reciprocating engine, but as long as it is employed, we can conceive of no better device for converting its motion into rotary than the crank.—EDS.

Loss by the Crank Motion.

MESSRS EDITORS :—In your issue of the 16th inst. I notice an article on a subject which has exercised my mind greatly for a long time, and I may be able to give you some data which will throw a little light on the subject in question, viz., the loss by the crank motion.

In the county of Cornwall, in England, the pumping is performed by engines which may be termed direct acting, inasmuch as they operate the pumps without the intervention of a crank, and as a very strict account is kept of the duty performed by all the mining engines in the county, some direct acting and some with a crank, we can therefore easily compare the relative merits of direct acting and crank engines. From Browne's "Engine Reporter" I extract the following data. In the year 1860, the pumping engine doing highest duty was one at Par Consol's which performed a duty of 94.7 millions of pounds raised one foot high by consuming one cwt. of coal, while the highest duty preformed by a crank engine was a stamping engine at Great Polgooth mine which performed a duty of 50.1 millions. This would seem to show pretty conclusively the practical loss by the crank motion, which I think results entirely from friction. So much for the loss. The next consideration which would naturally present itself, would be the means of preventing it.

It appears to be a self-evident fact that at each end of the stroke the power derived from the pressure of steam on the piston is entirely absorbed by friction, and that the least amount of friction is at two points at or near half stroke, or, in other words, the least amount of friction is when the course of the transmission of power from the piston to the crank is at right angles to the latter. Hence if we can by any simple contrivance transmit the power at right angles to the crank throughout the stroke, we shall have a reciprocating engine, working with the least possible amount of friction.

My reason for supposing that there is no theoretical loss in the crank is, that I hold it a fundamental mechanical principle, that (friction aside) by whatever means you produce the change, in exactly the same ratio as you increase the speed you decrease the power, and *vice versa*.

My motive for sending this communication is that I believe I have discovered the desired combination, and wish by discussion through your columns to ascertain if my hypotheses are correct.

THOS. PETHERICK, Jr.

Belfast, Maine, Nov. 25, 1861.

The Pinion Gear of a Water Wheel.

MESSRS. EDITORS :—Does it make any material difference where the pinion gear is set on a water-wheel ? That is, will it take more water or less, if the pinion is set nearly on top of the wheel, or nearly on a level with the shaft or center of the wheel ?

There is some dispute on the question among practical men. Will you give your opinion in the "Notes and Queries," and oblige J. R.

[The only difference that it makes is through the influence that it has upon the friction. If the pinion gear is set at a level with the axle of the wheel and on the side opposite to the full buckets, the pressure of the machinery will be added to the weight of the water to increase the friction upon the main journals. But if the pinion is set on the side of the wheel that takes the water, the weight of the water will come directly upon the pinion instead of prying across the axle, and the friction will be diminished. Morin's elaborate experiments showed that the friction of journals is in direct proportion to the pressure. By doubling the pressure we double the friction—other things being equal.—EDS.

Philadelphia Items.

NEW LARGE IRON-PLATED FRIGATE.—Messrs. Merrick & Sons, Philadelphia, state in a communication to the *Gazette* of that city, that they have contracted with the Navy Department to furnish an iron-plated war steamer of thirty-five hundred tuns, to be completed by the fifteenth of July next. The plates are to be 4½ inches thick, and are being made at Bristol, on the Delaware, and at Pittsburgh. They have received many of the plates, and are now planing them so as to fit the vessel. The foundry of Messrs. Merrick & Sons, presents a busy scene at this time. There are six hundred and twenty-five persons employed there, and almost all of them are engaged upon government work. Four boilers are in the progress of construction, for the iron-clad steamship, and two others for vessels to be built or in the progress of construction. For the want of room, the firm has been compelled to give out the manufacture of two boilers. The boilers for the United States frigate, *Powhatan*, are nearly completed, so that the vessel will not be delayed for the want of her machinery. Within a few days this firm placed the engines and machinery on board the side wheel steamer *Miami*.

Workmen have been engaged in reparing the blocking for the sloop-of-war to be built in the small ship-house.

The steam frigate *Powhatan* has been hauled in alongside of the *Tuscarora*, at the south pier. She is being inspected, to asertain the extent of the repairs necessary.

The work upon the sloop-of-war *Brocklyn* is rapidly progressing, and she will soon be ready to go into commssion.

The prize schooner *Mabel*, which was captured on the 15th of Nov., off Savannah, in attempting to run the blockade, arrived at the port of Philadelphia in charge of a prize crew. The *Mabel* had sailed from Havana and was bound to Savannah, Ga. Her cargo consists of seven bales of blankets, four cases of cloths, two cases of saddles and bridles, 120 bags of coffee, one case of pistols, and two cases of cavalry swords, besides other arttcles of small value.

Among the ordnance stores received at the navy yard, was a monster rifled canuon for the steamer *Miami*. It is abont ten feet long, from eight to nine inches in the bore, and wighs 7,960 lbs. This steamer will be ready for service in a few weeks, and will make a valuable addition to the navy owing to her light draft and the size of her battery.

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Progress of American Inventions in Europe---Boot and Shoe Machinery.

Some few weeks ago, says the *Coventry Herald*, we noticed a new and greatly improved sewing machine, the invention of Mr. Salisbury, an American gentleman, and we intimated at the same time that a company was about being formed in Coventry for the manufacture and sale of these machines. Within the last few days our attention has been called to another patent sewing machine, and from what we could see of its action, and the work it is capable of performing, there is little doubt but that it will effect as great a revolution in one department of the boot and shoe trade, as the ordinary sewing machine has done in the other. The machine is known as "Blake's patent sole-sewing machine," and is, we understand, the invention of a young man from the late United States. It is large and imposing in appearance, standing beside the little modest-looking ordinary sewing machines like a Triton among the minnows. The machine is made upon an entirely distinct principle to that of any other sewing machine yet invented, inasmuch as it sews with one thread only, and of course the action is obtained in an entirely different manner. When seen at work, one feels no doubt as to the quality and strength of the sewing. With each revolution of the wheel a formidable looking needle, holding a good thick waxed thread, descends with a sharp thud into the substance to be sewed, and by some legerdemain that we failed to perceive, loops itself underneath and comes up again with a snatch that tightens the stitch much more effectually, and altogether puts into the shade the old scientific turning out of the elbows, leaning forward of the chest, and desperate final jerk with which the knight of the stall was in the habit of forcing home the soling stitch, and clenching an argument with any friend who might happen to be present during the process. The material being sewn at the time of our visit was two pieces of sole leather just cut from a dry hide; the two measured three-eighths of an inch in thickness, and from the ease with which the needle went backward and forward through this substance, there was not the slightest doubt but that it might be made to go through double the thickness if required. The seam is along a channel that is afterward closed up so effectually that it is difficult to see the stitches, and the old channel-sewn sole is again produced as perfect and even much more perfect than it used to be by hand.

In the making of boots and shoes by this machine the sole is arranged for the "upper" to come between the inner sole and the outer one; the boot is then placed under the machine, and without the necessity of a welt, the whole is fastened together by stitches that go through the entire thickness of soles and upper, yet so neatly as to leave no ridge to irritate a tender foot on the inside, or expose the sewing to the wear of the pavement on the outside. When it is added that a pair of soles can be sewn on and completed in three minutes, it will be seen how completely impossible it is for human labor to compete with this machine. When the machine was first invented, only the sides were sewn up, and the toes and heels were left to be pegged or nailed; now, however, by a very beautiful contrivance, the machine can be made to sew round the toe and heel of the boot with the same ease as any other part. It is calculated that a woman could superintend one of these machines, and turn out 100 pairs of boots per day on an average. We were shown a pair of ladies' boots made by a machine of this kind, and for neatness and finish they excelled any hand-made boots we have ever seen. Some shoes of a stronger description were also shown, and these were equally excellent. If arrangements can be made for securing the machine for Coventry, there seems no earthly reason why Coventry should not become as celebrated for the manufacture of machine-made boots and shoes, as it has hitherto been for ribbons and watches. The machine patented by Mr. Salisbury is acknowledged to be a superior machine for light sewing to any at present in the market; this can be employed for preparing the tops, while Blake's sole-sewing machine would complete the boot; and under these circumstances, the home trade would in all probability be the least part of the demand that would spring up.

Queen Victoria's Crown.

Prof. Tennant thus describes the crown:—The imperial state crown of her Majesty Queen Victoria was made by Messrs. Rundell & Bridge, in the year 1838, with jewels taken from old crowns, and others furnished by command of her Majesty. It consists of diamonds, pearls, rubies, sapphires and emeralds, set in silver and gold; it has a crimson velvet cap, with ermine border, and is lined with white silk. Its gross weight is 39 ounces, 5 pennyweights troy. The lower part of the band, above the ermine border, consists of a row of 129 pearls, and the upper part of the band of a row of 112 pearls, between which, in front of the crown, a large sapphire (partly drilled), purchased for the crown by his Majesty King George IV. • At the back is a sapphire of smaller size, and six other sapphires (three on each side), between which are eight diamonds. Above and below the seven sapphires are 14 diamonds, and around the eight emeralds 128 diamonds. Between the emeralds and sapphires are 16 trefoil ornaments, containing 160 diamonds. Above the band are eight sapphires surmounted by eight diamonds, between which are eight festoons, consisting of 148 diamonds. In front of the crown, and in the center of a diamond Maltese cross, is the famous ruby, said to have been given to Edward Prince of Wales, son of Edward III., called the Black Prince, by Don Pedro, King of Castile, after the battle of Najera, near Vittoria, A. D. 1367. This ruby was worn in the helmet of Henry V. at the battle of Agincourt, A. D. 1415. It is pierced quite through, after the Eastern custom, the upper part of the piercing being filled up by a small ruby. Around this ruby, to form the cross, are 75 brilliant diamonds. Three other Maltese crosses, forming two sides and back of the crown, have emerald centers, and contain respectively 132, 124 and 130 brilliant diamonds. Between the four Maltese crosses are four ornaments in the form of a French fleur-de-lis, with four rubies in the centers, and surrounded by rose diamonds, containing respectively 85, 86 and 87 rose diamonds. From the Maltese crosses issue four imperial arches, composed of oak leaves and acorns, the leaves containing 728 rose, table and brilliant diamonds, 32 pearls forming the acorns, set in cups containing 54 rose diamonds and one table diamond. The total number of diamonds in the arches and acorns is 108 brilliants, 116 table and 559 rose diamonds. From the upper part of the arches are suspended four large pendent pear-shaped pearls, with rose diamond caps, containing 12 rose diamonds, and stems containing 24 very small rose diamonds. Above the arch stands the mound, containing in the lower hemisphere 304 brilliants, and in the upper 244 brilliants; the zone and arc being composed of 33 rose diamonds. The cross on the summit has a rose-cut sapphire in the center, surrounded by four large brilliants, and 108 smaller brilliants. Summary of jewels comprised in the crown:—1 large ruby, irregularly polished, 1 large broad-spread sapphire, 16 sapphires, 11 emeralds, 4 rubies, 1,363 brilliant diamonds, 1,273 rose diamonds, 147 table diamonds, 4 drop-shaped pearls, 273 pearls.

A Solution of the Cotton Question.

A London paper says:—"One of the most plausible suggestions yet made for the settlement of the cotton difficulty, is to impose a high differential duty upon all American cotton, to endure for three years. That would be in fact, a guaranty to the Indian exporter against a sudden return to low prices, and would most unquestionably exempt us at once and forever from our present dependence upon America. Already the Indian cotton market is in commotion, and there is the strongest reason to believe that the supply this year will reach Sir Charles Wood's estimate of a million bales. The shippers once secured against a sudden return to ruinous prices, would be able to double that quantity and to place Lancashire once more at ease. By the end of the three years the Indian railways will be complete, the Godavery canal will be in full work, and India ready to compete on equal terms with the South."

Some of the locomotives on the Great Western Railroad, England, have worked up to 750-horse power over and above back pressure in the cylinders. They have maintained an average pressure in the cylinders of 67½ lbs. on the square inch of piston, when running at the rate of 54 miles per hour.

The Story of the Shells.

The lectures on shell fish, prepared by Philip P. Carpenter, B. A., Ph. D., of Warrington, England, for the Smithsonian Institute, are thus beautifully introduced:—

Who has not admired the beauty of shells?—the rich luster of the cowries; the glossy polish of the olives; the brilliant painting of the cones; the varied layers of the cameos; the exquisite narcre of mother-of-pearl? Who has not listened to the mysterious "sound of the sea" in the whelks and helmets, or wondered at the many chambers of the nautilus? What child ever went to the sea-shore without picking up shells; or what lady ever spurned them as ornaments of her parlor? Shells are at once the attraction of the untutored savage, the delight of the refined artist, the wonder of the philosophic zoologist, and the most valued treasures of the geologist. They adorn the sands of sea-girt isles and continents now; and they form the earliest "footprints of the sands of time" in the history of our globe. The astronomer, wandering through boundless space with the grandest researches of his intellect, and the most subtle workings of his analysis, may imagine, indeed, the history of past time and speculate on the formation of globes; but his science presents us with no records of the past. But the geologist, after watching the ebb of the ocean tide, examines into the soil on the surface of the earth and finds in it a book of chronicles, the letters of which are not unknown hieroglyphics, but familiar shells. He writes the history of each species, antedating by millions of years the first appearance of man upon the planet, the abrasion of the Mississippi Valley, or the roar of the Niagara at Queenston Hights. He searches deeper and deeper into the rocky crust of the globe, still finding the same types in older characters. As he climbs the rocks of Trenton or Montmorenci, he treads on the tide-ripples, the rain drops, the trails of living creatures in the ancient Silurian sea, which he interprets by the rosetta stone of Chelsea Beach or Charleston Harbor; and as he reverently unlocks the dark recesses which contain the traditions of the early ages, between the dead igneous rocks and the oceanic deposits which intomb the remains of life, the first objects which meet his gaze are the remains of a thin, horny shell, so like those now living in the Atlantic and Pacific waters, that the "footprint" enables him to reconstruct a brachiopod with delicate ciliated arms and complex organization, such as is figured in the beautiful works of Owen and Davidson, from dissections of the existing species.

Daguerreotype Anticipated.

C. de Langue writes as follows to the *Photographic News*:—

Dear Sir:—I read in a recent number of your valuable paper "Electric Telegraph Anticipated," and thinking that the above title may also be of some interest to your numerous readers and my brethren photographers, I beg to state that in a French book, "Les fables de Fénélon," which has apparently been written for the education of the Duc de Bourgoyne, grandson of Louis XIV., in an able composition under the name of "Voyage supposé 1690," and among the many wonders of which the fable is made up, we read:—"Il n'y avait aucun peintre dans tout le pays, mais quand on voulait avoir le portrait d'un ami, un beau paysage, ou un tableau qui representât queque autre objet, on mettait de l'eau dans de grands bassins d'or et d'argent; puis on opposait cette eau à l'objet qu'on voulait peindre. Bientôt l'eau, se congelant devenait comme une glace de miroir, où l'image demeurait ineffaçable. On l'emportait ou l'ou voulait, et c'etait un tableau aussi fidèle que les plus polis glaces de miroir."

There was no painter in the whole country (the Island of Wonders); but when the people wished to have the likeness of a friend, a fine landscape, or a picture representing some other object, they placed some water in large basins of gold or silver, then they brought this water opposite the picture they wished to take. Soon, the water in congealing became similar to a looking-glass, where the image of that object remained fixed; they carried it where they wished, and it was a picture as faithful as if reflected from the best polished looking-glass.

How far from thinking, the noble and virtuous Fénélon must have been, when writing the above, that such a fabulous wonder might one day be no longer a fable, but a reality!

How glorious is the art through which such wonders are operated!

Swansea, Oct. 23, 1861.

The Lowell *Citizen* says that it has been decided to start up the entire works upon the Merrimac corporation as soon as the necessary repairs of machinery, now under way, can be completed. One or two mills will probably start up next week, and others in the course of two or three weeks. This corporation when fully under way employs about 1,700 females, and between 700 and 800 males.

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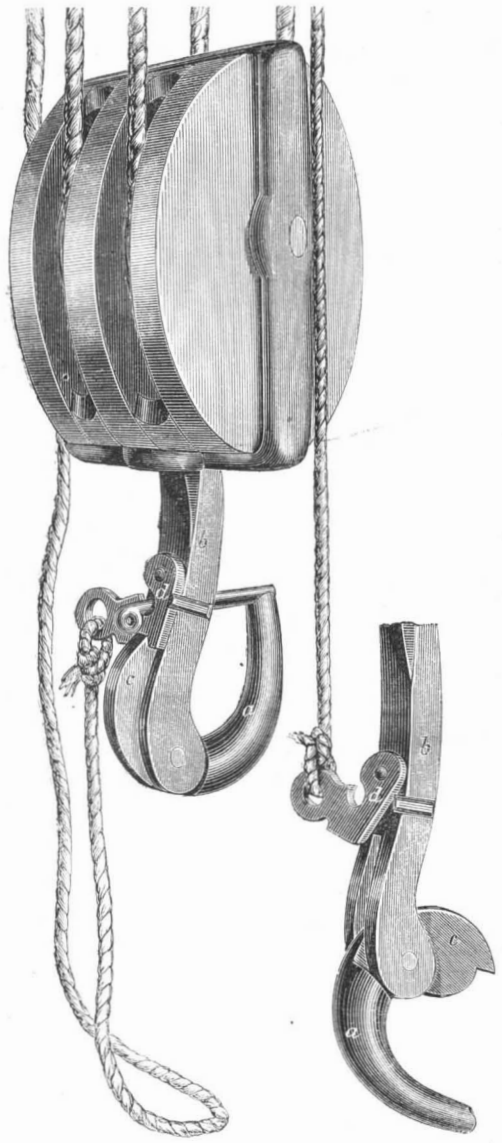
BIRDSELL'S SELF-OPERATING DAVIT AND CAT HOOK.

When a steamer is plowing her way through the ocean, no other cry can so quickly stir the sympathies of the little community on board as that of "a man overboard!" The wheels are instantly stopped, but the huge fabric drives onward a long way through the water before its momentum can be overcome. A boat is then lowered and rowed back in search of the missing man. The search is usually fruitless. The distance back is so great, and it is so difficult to ascertain the place at which the man fell, that generally before he can be found he sinks down into the depths of the sea. The writer of this has passed through one of these scenes, and probably no one who has had this experience has failed to wonder why some means cannot be devised for lowering boats more readily. In England a good deal of attention has been given



to this subject, though but very little in this country We now, however, have the satisfaction of illustrating a simple and practical mode of accomplishing the object, in the invention of W. H. Birdsell, of Elizabethport, N. J., the patent being assigned to himself and E. Kellam, of the same place.

The boat is suspended from davits, as usual, by two hooks, one at the bow and the other at the stern. One of the hooks, with its block, is represented in Fig. 1 of the engravings. The hook, *a*, is secured to the shank, *b*, by a pivot pin, so that it may turn down in the position shown in Fig. 2. A shoulder, *c*, is formed in the back end of the hook to be caught by the latch, *d*, for holding the hook in the position represented in Fig. 1, in which position it supports the boat. It will be seen that by lifting this latch the hook is allowed to drop down in the position represented in Fig. 2; thus releasing the boat from its hold. It only remains to make provision for lifting the latch, *d*, automatically, at the moment when the boat reaches the surf ce of the water. This is done by attaching one end of a small line to the latch, and the other end to the davit above, the trip line being of just sufficient length to become taut as the boat reaches the water's surface.

Repeated trials have shown that with this apparatus a boat may be lowered with perfect ease and safety from the quarter of a steam ship, and cast off while the vessel is under full head way.

The pin is provided for "mousing" the hook, as it is technically called; which is securing it to the ring to prevent it from losing its hold in rough weather. The pin is inserted in the position shown, and turned partly round when the projection upon its side enters a recess in the inner side of the latch, *d*, and holds it in place. The inventor thinks that this mode of mousing, from its convenience and security, will come into very general use. He also suggests the use of this hook for supporting the anchor.

The patent for this invention was granted October 1, 1861, and further information in relation to it may be obtained by addressing E. Kellam & Co., at Elizabethport, N. J.

LANERGAN'S DECKLIGHT.

For lighting the saloons of vessels below the deck it is customary to cut small openings through the deck and fill them with blocks of glass. The ordinary glass decklight consists generally of an elongated block of glass. When inserted in the deck of a vessel it has been held in place by cement or by means of a frame of metal screwed to the deck and arranged so as to lap over the edges of the decklight. Breakage of a decklight is a very common occurrence on

shipboard, and beside, when the decklight is fixed in place by means of putty or cement the latter is likely to become either loosened or cracked. The consequence of either breakage of the decklight or loosening of the cement is leakage of water through the deck whenever it is washed. Furthermore, the securing of a decklight into the deck by means of putty or a metallic frame, or both, is a matter of much trouble and care. All these evils are overcome most completely by the simple device illustrated by the accompanying engraving.

A circular block of glass has a thread formed upon it in the mold so that it can be screwed into the plank of the deck. Above the thread the block is enlarged and left in the form of a smooth cylinder, to fill the hole perfectly and make a tight, smooth joint. Below the screw the glass is made hemispherical or convex, to disperse the light and diffuse it in the room beneath. At the lower end of the block is a polygonal projection, *e*, to fit a wrench for turning the screw into place. In case the block should become loose, from the shrinking of the deck plank, it is easily tightened by giving it an additional turn. In place of the polygonal projection, recesses may be formed in the block to receive projections on the wrench; but this plan is objectionable, as the recesses interfere with the dispersion of the light, and the glass about them is liable to crack.

We are informed that this decklight is meeting with the universal approval of mariners and ship builders, and that it is regarded as a more important improvement than, from its simplicity, it might at first sight appear to be.

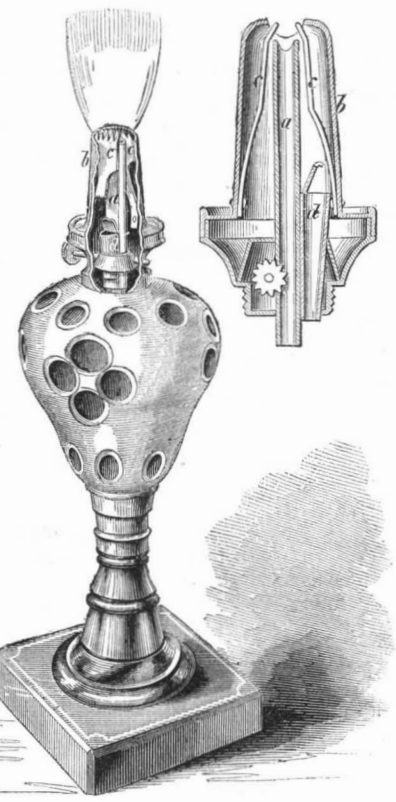
The patent for this invention was granted to the inventor, Henry Lanergan, Jan. 29, 1861, and further information in relation to it may be obtained by addressing Charles Smith (to whom it has been assigned), at No. 6 Central Wharf, Boston, Mass.

THE new pumps for the Philadelphia Water Works are each capable of discharging 120,000 gallons of water per hour. They are of 18-inch bore and 6 feet stroke.

MOREHOUSE'S BURNER FOR LAMPS WITHOUT CHIMNEYS.

It is a common remark that so many lamp chimneys are broken as to make the chimneys cost more than the oil or fluid used. Many lamps and burners have been devised for the purpose of dispensing entirely with the use of chimneys, but, for some reason, none of them have come into very general use. The burner which is here illustrated is represented to be practically successful, burning the oil perfectly without smoke or smell, and producing an excellent light.

Fig. 1 is a perspective view of a lamp with the burner, the outer case broken away to show the interior, and Fig. 2 is a vertical section of the burner. The wick tube, *a*, is made longer than usual and of a flat or oval form. It is surrounded by the metallic case, *b*, which encloses two copper or brass plates, *c c*. The burner is perforated at its base so as to admit two currents of air, one upon the inner, and the other upon the outer side of the plates, *c c*. The wick is lighted at the top, and as the flame issues through the orifice in the top of the cap, it is fed by two currents of heated air, one on the inner side of the plates flowing up against the base of the flame, and the other impinging against its side near its base. The



office of the plates, *c c*, is to conduct the heat from the flame downward into the currents of air, and to spread these currents into thin sheets in the proper position to bring them in contact with the ascending vapors of the oil.

The tube, *d*, is provided for filling the lamp by merely slipping off the case, *b*; obviating the trouble of unscrewing the burner. It is closed by a hinged cover so that it may be opened with facility.

This burner is of small expense and may be applied to an ordinary lamp. It is manufactured and sold by the inventor, William Morehouse, at Buffalo, N.Y., who may be addressed at that place, care of Pratt & Co., in relation to the purchase of rights, or for any further information concerning the invention.

The patent for this invention was granted through the Scientific American Patent Agency, Nov. 19, 1861.

Beardslee's Magneto-Electric Machine.

This machine, illustrated in our last number, has been used for several months by the electro-platers, L. L. & C. H. Smith, 244 Canal street, this city, and they inform us that it is more satisfactory in every respect than the battery. It is not only more cleanly and convenient, but it produces a better plate. The Messrs. Smith recently deposited a copper plate for a large map, and when the plate was finished of sufficient thickness to print from, the back side was perfectly smooth, and exhibited the minutest lines of the map in relief. They say that in their many years' experience they never saw such a plate deposited by the battery.

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VOL. V. NO. 24.....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, DECEMBER 14, 1861.

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TO OUR FRIENDS.

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OUR COUNTRY AND THE SCIENTIFIC AMERICAN.

In the ways of Providence, peace, industrial progress and international comity sometimes happily prevail and extend for a period of many years. Then again there will come fearful changes, in which the very fabric of society will appear to be torn up and shattered, and war, with all its attendant evils, will pass before us in dread reality. We are living witnesses of such scenes and convulsions in our own land. In the history of the world, the United States of America, in origin and progress as a nation, appear almost like a splendid miracle as compared with other nations. Within less than a century we have sprung into independent existence, and from dependent colonies, containing about three millions of people, and a domain confined along the fringe of the Atlantic shores, we have grown to be the second greatest commercial nation in the world. Our empire extends from ocean to ocean, embracing every variety of soil and climate, and our people number more than thirty millions. Our cities have sprung up, rivaling in extent and wealth those of the old world; and as regards power, intelligence, unity and all the great blessings of civilization, we called ourselves, perhaps truly, "the most happy people in the world." But evil times have now fallen upon us, so far as human vision can discern, and civil war "has been met as a stern necessity" by our regular and established government. We are engaged in grappling with the most gigantic rebellion on record, and all institutions, classes and interests are deeply interested in the issue; but we confidently hope that good will ultimately result from present evil. The SCIENTIFIC AMERICAN, like all its cotemporaries, has experienced depressing influences, but it still rears an unaltered front. Its entire subscription in the Southern States has been destroyed, and in a pecuniary sense the effect of the conflict has been very severely felt. Yet, although several of the daily, and many of the weekly papers in New York and other places have finally succumbed to the pressure of the times, or have curtailed their dimensions and reduced their expenses to maintain an existence, the SCIENTIFIC AMERICAN has gone forth to its subscribers weekly, the same in dimensions as formerly, and more elaborately illustrated than ever. Our great efforts to maintain its usefulness for literary, scientific and mechanical excellence, we believe will be appreciated by our readers, who, we hope will use their influence in a special manner at the present time to extend its circulation among their friends. If each reader would induce one neighbor to become a subscriber our Southern list would be more than redeemed. The price of subscription is only one dollar for six months. Even in these hard times, we do not know where a mechanic can make such a profitable investment of one dollar for half a year or two for twelve months.

In three weeks hence this volume will be concluded. We trust all our old subscribers are making preparations for a renewal accompanied with like remittances from many friends. We most earnestly appeal to the friends of the SCIENTIFIC AMERICAN to come forward now and show their regard for it. The publishers would strongly urge upon their numerous friends not to forget them, even in time of war.

HARBOR DEFENCES---MARTELLO TOWERS.

We notice that the good people of Philadelphia are somewhat alarmed respecting the defenceless condition of the river approaches from the sea to their goodly city. A correspondent of one of their daily papers has made the startling suggestion that the steam frigate *Merrimac* may steal out from Norfolk some dark night, enter the Delaware, ascend the river under a false flag, and lay Philadelphia in ashes within thirty hours after leaving the Chesapeake. This is more easily said than done, but it could be done with impunity so far as the defences of that city are concerned. Many of the leading men of Pennsylvania seem to be apathetic on the subject of harbor defenses, but not the people of Philadelphia. Their daily papers are discussing the question in its various aspects, and several contributors have presented their views upon it. Different kinds of defensive military works are proposed, and among the number martello towers. It is suggested that several of these be erected on favorable situations along the Delaware river, and mounted with large Rodman guns. A single shot from one of these huge pieces of ordnance striking a war ship —it is stated—would sink her, and from this assertion the conclusion is drawn that such towers armed with such guns would form the best modes of harbor defense. Perhaps this is true and perhaps not. The officers of the engineering corps, U. S. A., are the best judges of these things, and we exhort the people of Philadelphia to submit all such propositions to a proper board before they adopt any plans for protecting their city. When there appeared some probability of a war between the United States and Great Britain, arising out of burning the steamer *Caroline* in the Niagara river, in 1837, we remember that it was proposed to erect a great tower, several hundred feet in hight, in New York city, and mount it with a monster gun, so as to sink every war vessel that might pass the batteries at the Narrows. If we can form an estimate of the utility of such towers from the condition of those in England, they must be useless structures. They are tall circular buildings of masonry, and a great number of them were erected along the British coast at the beginning of the present century for defense against the anticipated invasion of Napoleon. Their name is supposed to be derived from such a tower, that once gave the English a hard tussle to reduce, in Mortella Bay, Corsica. They are provided with vaulted roofs, and usually consist of two stories—the lower one for stores, the upper one for troops. The wall terminates in a parapet which secures the gunners in working pivot guns capable of firing in any direction. Most of these towers have been dismantled; not one, we understand, is now used as a fort.

The great defect of martello towers arises from their very limited dimensions. When war frigates were no larger than our ferryboats, and when their heaviest guns were 32-pounders, such towers may have been effectual for repelling attacks by sea, but the broadsides of a single large frigate of the present day, we think, would soon destroy any martello tower that we have seen.

The best structures for harbor defenses are regular casemated forts. The forts at Hatteras Inlet and Port Royal were easily taken because they afforded no protection against the terrific showers of shell that were thrown into them. Had they been casemated and bombproof they could not have been taken so easily.

All permanent works for harbor defense should be casemated structures, but, at the same time, it appears to us that new modes of defense must be instituted for the new modes of attack, so scientifically carried out by Commander Dupont at Port Royal. By the agency of his steam engine the captain of a frigate can shift the position of his vessel continually, and thus baffle the gunners confined in a fort. When sailing vessels were exclusively used in attacking harbor defenses they became fixed targets like forts, and the contest was simply between wooden and granite walls. All this is changed; there is now much less danger of steam frigates being destroyed by land batteries than formerly, and a first-class iron-clad frigate could sail past any of our land batteries at 600 yards distance without being much injured.

To prevent war vessels passing up rivers and into important harbors, huge iron chains have been suspended at some depth across the channel. A boom of this character was thrown across the Hudson river at the Highlands, during the revolutionary war, and several of its links may still be seen in the State Museum at Albany. It was prepared by an ancestor of Col. F. Townsend, U. S. A., and the same agencies may again be used with advantage. There are nine forts and three batteries completed for the defense of New York harbor, and we think it would not be very easy for a hostile foreign fleet to come nigh the city; it is the Long Island and not the Staten Island shore, that appears to us the most inviting for a daring, skillful and powerful foe.

ROCK OIL.

There is nothing in the industrial world at the present time more remarkable than the production of petroleum. That great lakes of this valuable substance should have lain a few feet beneath the surface undiscovered for thousands of years, is one among innumerable proofs that the intelligence of civilization is required to enable man to bring to light and render available the natural resources of the planet which we inhabit. One very curious circumstance in the development of this industry was the tardiness of even our enterprising community to direct their attention to it after it was discovered. In 1826 an account of the Little Muskingum region, in Ohio, was published in *Silliman's Journal*, in which the statement was made that in boring for salt water vast quantities of petroleum was obtained, which was beginning to be in demand for lamps in workshops and manufactories. The writer says:—"It affords a clear, brisk light when burnt in this way, and will be a valuable article for lighting the street lamps in the future cities of Ohio." Though this account was published

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in 1826, the discovery was made in 1819, and yet this mine of wealth was suffered to lie unappropriated in the heart of this country for thirty-five years. Attention was again called to it by the success of the coal oil manufacture, and in 1854 two gentlemen in New York, Messrs. Eveleth and Bissell, secured the right to the upper spring on Oil Creek, in Pennsylvania, and organized a company to search for the oil. The operations were slow, and the first oil was struck at a depth of 71 feet, on the 26th of August, 1859. The drill suddenly dropped into a cavity, and oil rose within five inches of the surface. A pump being introduced the company were soon in the receipt of one thousand gallons of oil per day.

This success created an intense excitement in the neighborhood, and boring for oil became the great business of the community. The petroleum was found not only along Oil Creek, but in numerous other localities, extending from Virginia to Canada West, and the supply has increased so rapidly as to bring the article down to a very low price, and to make it a great staple for domestic use and for export. The Erie railroad has a large number of cars devoted exclusively to its transportation, its pungent and peculiar odor rendering the cars thus employed unfit for other uses. At the depot of the company in Hoboken thousands of barrels may at any time be seen on their way to this city either for export or distribution. The peculiar power which the substance has of penetrating capillary tubes covers the barrels with grease, and fills the air with its odor.

Petroleum has just begun to play the great part which it is destined to fill in the industrial arts. It yields a good lubricating material, and produces the whitest, best and cheapest of all artificial lights. A great variety of hydrocarbons result from its distillation, and these, in combination with other compounds and elements, produce thousands of new substances for innumerable untried uses of the chemist and the artisan. We anticipate for petroleum a more rapid extension to a great variety of applications than marked even the introduction of india rubber.

THE WAR AND BUSINESS.

Those of our dry goods merchants who have stocks of merchandise to sell at the market rates have been doing a better business this fall than usual. The sales have been large, to a very considerable extent for cash, and the credits granted have been far better selected, and therefore safer than usual. It is true that a good many of our traders complain of dull times; but they belong to a class who try to do a business beyond their means, and who are inevitably destined to bankruptcy whatever the state of affairs. But those who have capital or credit to buy goods at the lowest market rates have been doing an unusually good fall trade.

The war is demonstrating to our merchants that the value of the Southern trade to New York city has been considerably overestimated. We have long been satisfied that if the facts could be ascertained they would show this very result. This opinion was based on the general law that the business of every community is mainly at or near by home.

Though England is called the workshop of the world, and though it is true that she exports a large quantity of manufactured goods, still the statistics show that she is her own best customer; the exports forming but a small per cent of the total amount of her manufactures, nearly all being consumed at home.

The Boston merchants constructed the railroad to Albany for the purpose of bringing in the western trade. It was known that the road was to run through a comparatively barren and sparsely populated portion of the State, and very little support was anticipated from the inhabitants along the line. When the road was put in operation it was found that over eighty per cent of the receipts was from local business. The Boston and Providence, and nearly all other roads have had similar experience. The great number of trains which it is found expedient to run a short distance in the neighborhood of the cities also demonstrate the tendency of the business of every community to grow up near at home.

The proprietor of the New York *Herald* has stated repeatedly that the main support of that profitable paper is derived from the chamber maids of this city; and that its circulation in the State of Connecticut has always been greater than in all the Southern States combined.

It would be easy to multiply proofs of the existence of this law, but it is unnecessary. A moment's reflection will convince any one that the expense of transportation and the risk and inconvenience of distant operations must always exert a powerful tendency to confine the principal portion of the trade and industrial operations of any community to its own neighborhood. On another page will be found some statistics from the *Railroad Journal*, showing that the whole cotton crop of the South is certainly not more than equal to six per cent of the industrial operations of the North. We are satisfied that such diminution of trade as has taken place is to be attributed mainly to the interruption of labor at the North by the war, and, to a very limited extent, to the destruction of Southern commerce.

BENZOLE—ITS NATURE, PROPERTIES AND USES.

Robert Nichol, in his beautiful poem "Do not scorn," has taught us a moral lesson in regard to the wrong of despising the meanest of God's creatures; and a far higher teacher of morals—the Saviour—has rebuked the pride of man by placing "the glory of Solomon," in his kingly robes, beneath that of the flower which blooms in the valley. As it is with moral lessons drawn from natural objects so is it in regard to useful lessons derived from art and science. Perhaps there is not a more foetid and offensive substance to be found than coal tar, and yet from it we derive some of the most useful, pleasant and beautiful substances adapted to the wants, the pleasures and tastes of refined and common life.

Who would have imagined that this foetid substance could be made to yield a product which "the fair and the gay" would use as a perfume for the toilet, but it is even so. And from that dirty, black substance who could ever have imagined that dyes rivaling the Tyrian purple, the cochineal crimson, and orchillo lilac could be obtained, and yet it is even so. At the present day rich perfumes and brilliant colors are manufactured very extensively, as profitable branches of the arts, from coal tar. But beside these, there are other useful products obtained from the same source, and none more so than the liquid *benzole*. Many persons have heard of it and have wondered what it was—whether solid, liquid or gas; or whether it grew upon a tree, or came up out of the caves of the earth like petroleum oil.

Benzole was first discovered by Professor Farady, many years ago, when experimenting with the condensed vapors of oil; but it derived its name afterward by having been obtained in distilling benzoic acid with lime. Benzoic acid is a product of the odorous gum-resin obtained from the *styrax benzoin* of Sumatra and Borneo. Benzole is a clear colorless liquid of a peculiar ethereal, agreeable odor; it boils at 168° Fah.; its specific gravity is 0·85, and it freezes at 32° Fah. and becomes a white crystalline mass.

When solely obtained from benzoin it was very expensive, but, in experimenting with coal tar about the year 1847, C. B. Mansfield, of Manchester, England, found, among several of the oils obtained at different degrees of temperature in distillation, benzole, as the second of six—all of different specific gravities. This discovery led to its becoming comparatively cheap, and from that day to this its application has been extending. It is now manufactured from the naphtha obtained from coal tar, in large quantities, in London, Manchester, Glasgow and nearly all the large cities in Great Britain. A few years since its manufacture was introduced from London into this section of our country, and is now conducted in North Second street, in the Eastern District of Brooklyn. Crude naphtha is distilled in an iron still, at a temperature varying from 176° to 194° Fah.; benzole passes over and is condensed. It, however, contains some impurities which are removed by redistillation and washing with dilute sulphuric acid, water and weak alkali, in succession. A fluid called "benzole" is obtained as oneof the products of petroleum oils.

When atmospheric air slightly warmed, is passed through benzole, it takes up a portion of it, and becomes a vapor of great illuminating power. In 1836 a patent was taken out in England by M. Beel for forcing common air into a reservoir containing benzole, and burning the vapor thus obtained in the same manner as common coal gas. Since that period several apparatuses have been devised for using it. Were it not that it condenses in cold weather and chokes up the pipes, it would be the most convenient known substance for making gas to illuminate large houses, schools, colleges, &c., in the rural districts.

Benzole dissolves resins and fatty substances, and is used for removing tar, resin and grease spots from light kid gloves and silks. It has been imported from Europe and sold in small bottles at extravagant prices for such purposes. Since the war commenced and turpentine has become so high in price, petroleum benzole has been used, to a large extent, as a substitute for mixing with paints, and in the making of varnishes. In England it is used for scouring greasy wool in carpet manufactories. As it is a powerful solvent of india rubber and gutta percha it makes with them a very adhesive cement.

By adding benzole cautiously to strong nitric acid, assisted by a gentle heat, a compound is formed in the form of a yellow oil, which, when the mixture is diluted with water, sinks to the bottom of the vessel. This oil has a sweet taste and the odor of bitter almonds, is used in perfumery, and is sold under the name of the oil of bitter almonds.

By combining nitro-benzole with hydrogen, aniline is formed, which is the basis of the beautiful purple and red colors that have lately been introduced into the arts of dyeing and printing. As heretofore manufactured, such colors have been subject to deterioration by fading when exposed to sunlight, but this defect, we have reason to believe, has been surmounted. Several samples of fabrics colored with aniline products manufactured in France, have lately been furnished us for trial by exposure to solar light, and thus far the test has been favorable.

Benzole is a carbide of hydrogen. It consists of twelve atoms of carbon and six of hydrogen. As a solvent it is nearly similar to ether and alcohol, and it may be used as a substitute for these fluids. Many of the most beneficial improvements that have been made in recent years have been in reclaiming and applying to useful purposes things which were formerly held to be positively useless. This has been the case preëminently with such products as benzole.

Gas Explosion.

We noticed in the Boston papers a few days ago that a serious explosion of gas took place at the residence of Ezra Lincoln, Esq., of Boston. The basement and the walls of the building were damaged to the extent of from five to eight thousand dollars, and Mr. and Mrs. Lincoln were considerably injured. Accidents of this character have frequently occurred.

Illuminating gas alone will not explode, but if the gas is intimately mixed with oxygen—either the oxygen of the atmosphere, or that from any other source—then on the application of fire, the whole of the gas combines at once with the oxygen; in other words, it burns instantly, or explodes. When the smell of gas is strongly perceptible in a room, the windows should be thrown wide open to drive out the explosive mixture; the leak should not be sought for with a lamp or candle, as the escaping jet will take fire on the approach of a flame. In France, several inventions have been patented for detecting leaks in gas pipes.

Something Novel.—Mr. H. Berkeley, M. P., in a recent speech on American affairs at Bristol, England, audibly proclaimed the following striking novelty:—

To such an extent is the distinction carried out, that when, on the 4th of July, the anniversary of American independence is celebrated, the black man is not allowed to celebrate it on the same day as the white man—and therefore the *whites celebrate their great national festival on the fourth, and the blacks on the fifth.*

Mr. Berkeley is evidently an original genius, else he never could have made so remarkable a discovery. It is entirely original with him. We never heard of it before.

Our Canadian friends are unjustly alarmed on the subject of a probable war with the United States. The government and the people of the States have no more idea of attempting to invade the Canadas than they have of attacking Belgium. A few irritable newspapers, and a few blatant politicians on both sides are stirring the embers somewhat, but we believe the conservative good sense of the people will prevail and that peace will be maintained.

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TO THOSE AMERICAN CITIZENS WHO DESIRE TO BECOME EXHIBITORS AT THE WORLD'S FAIR, LONDON, IN 1862.

The U. S. Commissioners have nearly completed their arrangements, and the "Special Instruction to American Exhibitors," including extracts from the decisions of her Majesty's Commissioners, will be published in a few days. Meantime, we announce below, the names of those agents or Assistant Commissioners already appointed by the Executive Committee, whose duty it will be to examine and report to the Executive Committee on articles submitted and intended to be exhibited. On their approval, the "Permit of Exhibition," required under the English rules, will be issued at once. Applications to any one of these Assistant Commissioners, named below, must specify,

1. The name, in full, of applicant, and name of firm.

2. Nature of the business carried on by him or them.

3. Address—street, number, town, county, State.

4. Article or contribution offered, name and description (for catalogue), how worked and date of invention.

5. Number of class and section in which to be exhibited.

6. Space required for its exhibition, in square feet, and whether wall, floor or counter space.

Blanks for this purpose are in the hands of those Assistant Commissioners.

American Exhibitors, who choose, can send their contributions by any agent of their own, or any private or other means of conveyance, taking care to be provided with the "Permit of Exhibition," and to mark the packages and invoice them, and consign them, as required by the English rules, quoted in the special circular to be printed in a few days. Those who prefer, may send their contributions to the vessel, free, to be provided by the government for that purpose, which will sail on the 12th of January. Goods intended to go by this vessel must be in New York by the 10th day of that month. None will be received afterward to be sent by the government vessel.

Contributions will be received at the building, in London, up to the 31st day of March, 1862, and with a view to facilitate and to afford the largest opportunity to American citizens for their contributions, the Commissioners here will issue permits of exhibition till the 1st of March, 1862, and none later. No articles, therefore, can be admitted which are not ready on time, so as to allow the report of the agent or Assistant Commissioner to be made and forwarded to Washington by or before that date.

All packages must be directed and labeled as follows (labels in the hands of agents below): "To the Commissioners for the Exhibition of 1862, building in South Kensington, London. Contributions from the United States; forwarded under the sanction of the American Commissioners, by (name of special forwarder), agent at (point of shipment), from (exhibitor's name), of (residence), contents (state name and nature of article within), for class (number of class in which to be exhibited), value ($), weight of package (lbs.), consigned to (name of agent of exhibitor, or general agent of commission), London."

All other information and circulars can be had by applying to the Executive Committee, at the office of the Commissioners, No. 10 Patent Office Building, Washington, to which address all letters and communications should be sent, or to either of the following-named commissions, assistants or agents, to examine and report on contributions. Articles now ready, examined, approved and permitted, may be sent to the care of Mr. Joseph E. Holmes, No. 61 Canal street, New York, agent here, and will be stored by him free of expense till the United States vessel sails.

The list of Commissioners and Assistant Commissioners appointed to examine, with their places of residence, are as follows :—

Marshall P. Wilder, Esq., Boston, Mass.
P. B. Tyler, Esq., Springfield, Mass.
Frederick Smyth, Esq., Manchester, N. H.
Charles Whittlesey, Esq., Hartford, Conn.
T. J. Stead, Esq., (P. M. G.,) Providence, R. I.
Eli Whitney, Esq., Commissioner, New Haven, Conn.
Joseph E. Holmes, Esq., No. 61 Canal street, N. Y.
B. P. Johnson, Esq., Commissioner, Albany.
A. L. Elwyn, M. D., Philadelphia.
Charles Danforth, Esq., Patterson, N. J.
Edward Atterbury, Esq., Trenton, N. J.
James R. Partridge, Esq., Commissioner, Baltimore, Md.
George H. Knight, Esq., Cincinnati, Ohio.
J. H. Klippart, Esq., Commissioner, Columbus, Ohio.
James F. Harney, Esq., Ladoga, Ind.
J. W. Hoyt, Esq., Madison, Wis.
Leland Stanford, Esq., Sacramento, Cal.
W. Duane Wilson, Esq., Des Moines, Iowa.
H. F. Q. d'Aligny, Esq., Copper Harbor, (L. S.,) Mich.

THE ATLANTIC MONTHLY.

It is a common remark that the *Atlantic Monthly* is superior to *Blackwood's Magazine*. Long accustomed to read with very respectful admiration the delightful pages of "Maga," we have been slow to believe that it was surpassed by its youthful rival, but we have at last been brought fully to this belief. We had a strong prejudice against some of the writers, especially Mr. Higginson, which has been thoroughly conquered, and we now regard him as one of the most brilliant magazine writers in the world.

While the *Atlantic Monthly* will compare favorably with *Blackwood* in the learning, the variety, the wit, the vivacity, and the general literary ability which characterize its articles, its superiority is mainly due to the spirit which animates it. *Blackwood* is the advocate of the High Church and Tory party of England, while the *Atlantic* is thoroughly imbued with that large sympathy with universal humanity which generally pervades the higher walks of literature throughout the civilized world. Desiring the continued supremacy of a privileged class, the writers for *Blackwood* look with avowed jealousy and aversion upon the spread of education among the masses, while those of the *Atlantic* enter with temperate but hopeful zeal into the great movement which is raising the vast majority of mankind from the degradation of ignorance, intemperance and superstition, and is carrying our race onward and upward in the path of civilization. This difference in the spirit of the two publications gives great advantages to the American magazine over its Scotch prototype. Though the members of a clique or party may be tickled by adroit cuts at the weak points of the adversary, and though the boldest sophistry may be regarded by them as irrefragable logic, neither the wit nor the reasoning has the same charm for the indifferent public outside. The most powerful and cultivated intellect when employed in advocating the narrow interests of a class, finds itself cribbed and coffined in, while a mind engaged in proclaiming the broad principles of universal justice, truth and right, is lifted by its theme to flights apparently above its power.

The *Atlantic Monthly* has done more to raise the standard and to enhance the fame of American literature than any other periodical publication, and we are pleased to see that the December number is not inferior to its predecessors. It is published by Ticknor & Fields, Boston.

THE KIND OF GUNBOATS WANTED.

A correspondent of the New York *Times* on board of the frigate *Roanoke*, states that gunboats of very light draft of water, not large frigates, are the kind of vessels now required to make an effective southern blockade. There are a great number of inland seas in the South, separated from the ocean by narrow necks of land, in which there are many shallow gaps, by which vessels of light draft can pass in and out and carry on an illicit traffic. The two gunboats *Resolute* and *Reliance*, drawing only from six to seven feet, are the very kind adapted for this service, and fifteen of such are needed. Each is 93 feet in length 16 feet in breadth, draft of water 6 feet 5 inches, tunnage 100 tuns. Their hulls are very strong; they are heavily coppered, and their sterns are protected by thick boiler iron. They are supplied with vertical direct-acting engines; the cylinders are 17 by 17 inches. The diameter of their propellers is 7 feet 8 inches, pitch 14 feet, and 4 blades. The boilers are return tubular 15 feet in length, by 6 feet ten inches in breadth, hight 8 feet. Each boat consumes only about one tun of coal in four hours, and the boilers carry steam at a pressure of 100 pounds, and the engine and boiler do not weigh quite twenty tuns. They are stanch and very fleet little gunboats—perfect little bull dogs of war, and are a terror to all the smuggling, sailing schooners on the "secesh" coast of Virginia where they have been cruising.

Regimental Hospitals.

A most intelligent writer on this subject advocates regimental hospitals as being far preferable to general hospitals, because his experience has demonstrated the fact that they are not so liable to be overcrowded, and, at the same time, patients are not so liable to be neglected in them as in very large establishments. A temporary general hospital, near a scene of action, or a place undergoing a siege, has occasionally been found of great service. There was such a hospital establishment near Sebastopol, into which the men who were struck down in the trenches were first carried. It consisted of forty huts, arranged with three broad streets, paved with stone between them, and they were separated about twelve feet from one another. Ditches were dug along the sides of these streets, and the huts were dry, perfectly drained and thoroughly ventilated. By the English army regulations 600 cubic feet of air space has been allowed for each invalid and 800 cubic feet for those who are affected with "granular opthalmia." This is a disease of the eyes which sometimes breaks out in camps and becomes an epidemic of an alarming character. Plenty of fresh air and fresh food, with the application of nitrate of silver, are the best specifics for it. Cleanliness of clothing, of person, and purity of atmosphere, with fresh food, warmth and pure water are the grand agents at the command of careful surgeons and nurses for the sick and wounded in armies.

The Pontoon Brigade.

The engineering brigade of the army of the Potomac is becoming exceedingly skillful and thoroughly disciplined in the construction of flying bridges with pontoons. Recently, and immediately after the great review of 75,000 troops, this brigade, under the supervision of Col. Alexander, in presence of General McClellan, constructed such a bridge three hundred feet in length in the short space of twenty minutes, and a file of soldiers at double quick time marched over it. It was sufficiently strong for bearing wagons and artillery, and the general and other officers present were highly gratified with the result. We have been informed that thirty-four boats are now being constructed for this brigade; each is to be thirty-one feet in length and two feet and a half deep, with the bottom flat. The width of the boat in the middle is six feet and a half, while the rear end is five feet and the front two feet and a half. The trestle-work consists of pine boards, capable of bearing a wagon or piece of artillery, and sufficiently wide to allow the passage of eighteen men abreast. The trestle boards are to be secured together on the boats, which are to be placed at a convenient distance, so that a continuous bridge is formed extending from 600 to 900 feet. On the outside of the boats are iron rings, by which, when being transported on land, they can be secured to the axles of a four-wheel wagon, the boats serving in place of the body of the vehicle to convey the trestles.

HORSE SHOEING IN WINTER.—Some blacksmiths seem to forget that horses shod in the winter should have the inner side of the shoe of such configuration as to let go easily of snow balls formed within the hoof. It only requires a gradual increase in size outward, with no dovetailing in figure, and each ball, almost as fast as formed, will readily be parted with. Why could not the horseshoe, for city use, have a slight coating of gutta percha on its upper side, so as to break the momentum of blows on the paving stones? This would materially ameliorate the difficulty so frequent in cities, where one-fifth of the horses have their feet ruined in a few years by continually treading on too solid pavement.

THE carrying capacity of the marine fleet trading between Chicago and Eastern seaports is not far, if any, below 45,000,000 bushels of grain, yet the receipts of produce at that port for the present season have been so immense that this fleet has been unable to carry it off as fast as it accumulated, and at the close of navigation will leave at Chicago over 3,000,000 bushels of grain in store.

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Internal Commerce of the Country.

[From the American Railroad Journal.]

One result of the rebellion, the object of which was to secure the commercial independence of the South, has been not only to annihilate its commerce, but to show that it constituted so inconsiderable a proportion of that of the whole country that its loss will soon hardly be missed. Nearly all the products of the South entered into the channels of commerce, so that their value can be readily estimated. For the whole, $275,000,000 is a liberal estimate, of which cotton may be put down at $200,000,000. This, by itself, is a vast sum, but relatively to the commerce of the whole country, a very small one, as will be seen by a statement of that of the Northern States.

The State of New York is the only one in which freight on its public works is so classified that accurate estimates can be formed of its value. The following is a statement of the number of tuns and value of the same moved on the railroads and canals of the State :—

RAILROADS.

Kind of Freight.	*Tuns Carried.*	*Value per Tun.*	*Total Value.*
Products of the forest...	372,424	$20	$7,468,480
Products of animals	895,519	200	179,103,800
Vegetable food.....	1,103,640	50	55,182,000
Other agricult'l products	143,219	15	2,145,280
Manufactures.....	511,916	250	127,979,000
Merchandise.....	783,811	500	391,905,500
Other articles.....	930,240	10	9,302,440
Totals.....	4,741,773	$163	$773,096,500

CANALS.

Products of the forest...	1,509,977	$7	$10,654,710
Products of animals	19,882	253	5,030,067
Vegetable food.....	1,659,158	30	49,710,838
Other agricult'l products	3,714	29	1,100,069
Manufactures.....	268,759	30	8,113,177
Merchandise.....	250,360	337	84,250,428
Other articles.....	938,364	13	11,989,909
Total.....	4,650,214	$37	$170,849,198
Add tunnage of railroads	4,741,773	163	773,096,500
Total.....	9,391,987	$100	$943,945,698

The canal is almost exclusively used for the coarser kinds of freight ; the railroad for the more valuable kinds. The value of the freight on railroads is made up from estimates of experienced forwarders ; that on the canals from the manifests of shippers.

The number of tuns carried on the railroads of Massachusetts for 1860 was 4,094,369, having an aggregate value of $667,382,147, adopting the value per tun estimated for the railroads of New York. The tunnage of the public works of the two States for the year was 13,486,351, having a value of $1,611,327,845 ; a sum eight times greater than the cotton crop, and six times greater than the products of all the cotton States. But the commerce of the public works of the two States by no means embraces the whole that is carried on in them. In New York there is a vast commerce on the Hudson river and the lakes, to say nothing of the immense trade carried on in both over ordinary roads.

The length of the railroads of Massachusetts and New York engaged in the transportation of freight, is 1,317 miles in the former, and 2,569 miles in the latter. The tuns carried per mile in the former is 3,108, and in the latter 1,867 ; the average for the two States is 2,276 tuns per mile. There are in the loyal States fully 23,000 miles of railroad in operation. If we estimate the tunnage for the whole to be one-half that of the railroads of Massachusetts and New York, the aggregate tuns moved on them is 26,174,000. At a valuation of $163 per tun the aggregate value of their tunnage is $4,266,362,000. The tunnage of the canals probably exceeds $12,000,000, having a value of say $30 per tun, or $360,000,000. The total tunnage of the public works of the North, consequently, is 38,174,000 tuns, having a value of $4,626,362,000. The amount of the tunnage is unquestionably largely underrated. We are confident its value is not overstated. In bulk, it is forty-five times greater than the whole cotton crop. In value, twenty-three times greater.

Formidable Expedition down the Mississippi.

Vast numbers of troops and munitions of war, gun boats and floating batteries, are assembled at Cairo, for the intended expedition down the Mississippi.

The gunboats, fifteen in number, are most formidable looking instruments of war. The seven that have been built under contract by Captain Eads look as if they could safely venture upon a tilt or a bat, with Hollins' famous steam ram. The bows and bow bulwarks consist of about three feet of oak timber, bolted together and sheathed with the best quality of wrought iron plate 2¼ inches thick. The sides have the same sheathing, with less bulk of timber. Each boat is pierced for thirteen guns, four on each side, three in the stern, and two at the bows. The bow guns are 81-pounder rifled cannon ; the others are 8-inch columbiads. The sides of the boats both above and below the knee, incline at an angle of 45° and nothing but a plunging shot from a high bluff could strike the surface at right angles. The boilers and machinery are so situated as to be perfectly protected, and may be considered quite out of danger. The iron plating has been severely tested by shots from rifled cannon at different distances, and has shown itself to be utterly impervious to any shots that have been sent against it, even at a range of 300 yards.

Take them altogether, the boats are about as formidable looking instruments of destruction as ever navigated American waters, and if such a wise combination of oak, iron and saltpeter, will not bring the persimmons, we will call them sour, and let Commodore Hollins pull them down and eat them at his leisure. These fifteen gunboats, with their 200 columbiads and rifled cannon, are but a fraction of the warlike fleet destined to swarm down the Mississippi. There are thirty-eight floating batteries of a 64 columbiad each, and twenty-eight river steamboats.

The military part of the movement, it is supposed, will be under the command of Major-General Halleck, who is now organizing his forces in St. Louis, and he will be joined by General Grant's column at Cairo, and the column of General Smith from Paducah. The expedition will probably be from 80,000 to 100,000 strong, a force that ought to be able, properly followed up, to open the Mississippi to its mouth.

The Sentiments of our Cotemporaries.

To find room for all the flattering notices which this paper receives at the hand of its cotemporaries would occupy too much of the space of these columns, but we desire occasionally to insert a flattering notice, to show how kindly our editorial brethren treat us, and how highly they value our labors. The following is from the *Standard*, published at St. Andrews, New Brunswick :—

The Scientific American, which we have had occasion to notice at various times, is one of the cheapest, as well as most reliable, sources of information to the mechanic, millwright, and, we add, agriculturist, on this continent; it is conducted with marked ability and tact, its conductors are men of scientific attainments, and have the faculty of conveying information in an attractive form and in a concise and perspicuous manner ; in addition to which they give notices of the most important inventions, which are frequently accompanied with engravings. The paper is printed in a convenient form for binding, contains 16 pages each week, with a number of beautifully executed illustrations—making a yearly volume of 832 pages, at the low price of $2 per annum. Each number contains a complete list of the claims of all the patents issued each week at the U. S. Patent Office, and a column devoted to the metal and lumber markets. We trust our artisans will subscribe for this standard work, one number of which is of more value to them than all the trashy "story papers" published. Ten copies 12 months will be furnished for $15.

The above being from a British journal the editor refrains from alluding to the war department of our paper lest, we suppose, he might not seem to be in that neutral vein in which all English subjects are so desirous to remain concerning our unhappy war. The Andover (Mass.) *Advertiser*, however, says the following in relation to the war feature of the Scientific American :—

Every one is naturally desirous of obtaining the earliest and most reliable information respecting the events of the war and the means used by the respective combatants for its prosecution. It is a civil war; both parties were lately one; and the implements of carnage are equally well known in both sections, particularly to the officers who were so lately in the government service. The inventive genius of the people is now stimulated to the highest pitch by the demand of patriotism, as well as the hope of reward. The mechanical talent of the North is constantly developing new implements and fresh improvements, which will naturally assist their cause. With all these improvements we shall all need to keep up our acquaintance. For sometime past the Scientific American has given a very clear, reliable and full account of the progress of events. It devotes special attention to new inventions, and furnishes engravings of most of them, with such descriptions as enables one to understand the machine illustrated almost as well as, and in some instance better than, if the machine were before you. This paper is devoted to the interests of mechanical iuventions and industrial pursuits generally, and stands at the head of its class.

The salt works now in operation in Michigan, number nine, using six hundred kettles, and yielding a product of five hundred and fifty barrels daily.

RECENT AMERICAN INVENTIONS.

Reaping Machine.—This invention relates, first, to an improved raking device so constructed and arranged as to admit of being adjusted to suit the hight or length of the grain and operate perfectly at all times. To insure this result it is necessary that the rake or shoe strike the cut grain about midway the length of the latter, and be properly guided and sustained at all points of its movement, and all retrograde movement avoided ; and also that the cut grain be raked from the platform in gavels of uniform size. Second, it relates to a novel arrangement of the gearing or sickle and rake-driving mechanism, and the relation of the same with the draft pole, whereby side draft is principally counteracted, as well as the downward tendency of the sickle during its cutting operation. And third, this invention relates to an improved manner of connecting the reel with its supports, whereby the reel may be adjusted relatively with the sickle or cutting device as desired, and also to an improved arrangement of a divider at the grain end of the platform, whereby the divider is made to perform the double function of a divider and reel support. It was patented by John Tustin, of Petaluma, Cal.

Steam Boiler.—Mr. Silas Stuart, of Sterling Center, Mass., has invented an improved boiler which he claims may be constructed in an economical manner for the purpose of generating steam or heating water with a very moderate consumption of fuel. To this end the boiler and fire chamber are constructed and arranged in such a way that the water will be exposed to a large heating surface, and with a fire chamber of very moderate dimensions, the latter being of annular form in its horizontal section, and interposed between two concentric water chambers, which comprise the boiler, the antechamber being encompassed by a flue from the fire chamber. The invention has also for its object an improvement in the grate of the fire chamber, whereby admission of air into the fire chamber may be graduated with great nicety and the ashes from the fire chamber readily discharged when necessary.

Car Truck.—This invention, patented by M. La Rue Harrison, of Burlington, Iowa, consists in a certain mode of suspending the bolster from the springs by means of swinging stirrups, whereby the weight of the car may be transmitted to the trucks at points near the bottom or below the springs instead of above them, and the car, in case of any lateral movement, is caused to swing like a natural pendulum, instead of rocking like an inverted pendulum. An illustration of this invention appeared in our last number.

Improved Locomotive.—This invention consists in the employment, in a locomotive, of wheels applied to bear against opposite sides of a rail, such wheels on one or both sides being the drivers, in combination with supporting wheels, rolling on the top of the same rail, making a light and cheap engine adapted to a cheaply-constructed permanent way, which makes it specially applicable to the purpose of canal towing. It also consists in the employment of a portion of the weight of the locomotive acting through the intervention of levers or their equivalents, to press such driving wheels toward the side or sides of the rail. The inventor is John L. Whetstone, of Cincinnati, Ohio.

Variable Cam.—This invention relates to cams for producing movements in a direction parallel, or nearly so, with their axes of rotation. It consists in a peculiar construction of such a cam whereby its throw can be varied at pleasure, and it may be made to operate in all conditions, without any percussive action, and consequently without noise. Patented by the inventor, W. H. Andrews, of New Haven, Conn.

Aerial Ship.—This invention consists in the use of oscillating wings of improved construction attached to the sides of a boat-like car, causing it to ascend, maintaining it at a given elevation, or regulating its descent through the air, as may be desired. Also in a certain arrangement, in combination with such wings, of a screw propeller, for giving the car a movement in a horizontal direction, and of spiral-bladed wheels, like screw propellers, for assisting the side wings in producing the ascent, maintaining the elevation or regulating the descent of the car. The inventor of this machine is W. F. Quimby, of Stanton, Delaware.

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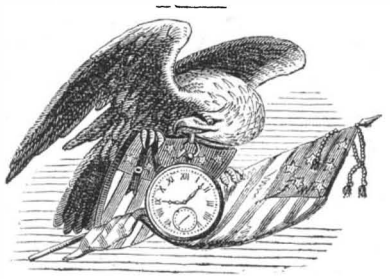
PATENTS FOR SEVENTEEN YEARS.



The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, except in reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

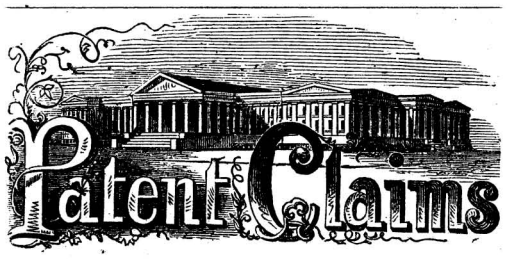
Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING NOVEMBER 26, 1861.

Reported Officially for the Scientific American.

THE PRINTING OF PATENTS ABANDONED.

The plan adopted by Commissioner Holloway of printing the specification which forms part of the Letters Patent, he has been obliged to abandon owing to the reduced receipts of the Patent Office. Hereafter, for a time, the specifications will be engrossed on parchment as formerly. This change will obviate the great delay which has attended the issuing of patents after sealing, but the papers do not go out looking so neatly. We hope the receipts of the Office will soon justify the extra expense which attended the printing.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

2,766.—Charles H. Alsop, of Middletown, Conn., for Improvement in Revolving Firearms:

I claim, first, In combination with a breech pin applied as described, the shoulder, i, so formed in the chamber by counter boring that the force of the explosion acting upon it will tend to press forward the cylinder or chambered breech into contact with the barrel, while the force acting against the breech pin will tend to press it back against the recoil shield or its equivalent, substantially as described.

Second, In a revolver or many-chambered firearm, I claim forming recesses, f f, in the sides of the breech pins, to fit to the peripheries of the adjacent ones, substantially as and for the purpose specified.

2,767.—W. H. Andrews, of New Haven, Conn., for Improvement in Variable Cams:

I claim the variable cam, composed of a hub, A, ring, B, spring, D, and nut or adjustable collar, C, the whole combined and operating substantially as specified.

2,768.—Achille Berthond, of New York City, for Improvement in Apparatus for Advertising:

I claim giving to the band an intermittent motion of alternate, advancing and resting, as described.

2,769.—Mills L. Callender, of New York City, for Improvement in Vapor Lamps:

I claim the relative arrangement of the two burning wicks, d d and c c, by which the wick, d d, is set to burn higher than the wick, c c, and two or more wicks can be simultaneously raised or depressed in by one ratchet wheel or one wick tube, in the manner and for the purpose specified.

2,770.—A. C. Chamberlain, of Newport, R. I., for Improved Method of Growing Plants and Fruits:

I claim the construction of a basket or vase for growing fruits and plants, with a perforated plate, C, to receive and hold the plant, and a receptacle below the plate for holding the substances from which the plant is to derive nutriment, substantially as shown and described.

I also claim the employment of a filling tube, D, with said plate and basket, as and for the purposes set forth.

[An engraving of this invention appeared on page 243 of the present volume.]

2,771.—A. S. Davis, of Boston, Mass., for Mode of Attaching Blocks to Belts of Printing Apparatus:

I claim the attaching of engraved or indented wooden blocks, a x, to their endless belt, G, by means of straps or loops, b x, substantially as shown and described, when said blocks and belt are used in a machine for printing addresses on newspapers, as set forth.

2,772.—I. H. Dennis, of Louisville, Ky., for Improvement in Equalizing Beams and Levers in Railroad Cars:

I claim the equalizing beams, H, connecting the disturbing beams, F F, and operating in combination therewith, in the manner and for the purposes shown and explained.

2,773.—Bridge Frodsham, of New York City, for Improved Material for Mattresses, Cushions, &c.:

What I claim as a new article of manufacture, forming an elastic material for cushions, &c., is the fine polygonal strips of cork, formed as specified.

2,774.—W. O. Grover, of Boston, Mass., for Improvement in Sewing Machines:

I claim, first, The combination of a supporting table, and an eye-pointed piercing needle, with a lower needle, having motions in six directions, substantialy such as described, and for the purposes specified, the combination being substantially as set forth.

Second, I claim imparting motions in six directions to a lower needle, by means of an inclined crank pin, substantially in the manner specified.

And lastly, I claim in combination a tension apparatus, a check spring and nippers, when they are relatively arranged and combined, substantially as described, so as to operate substantially in the manner and to produce the effects set forth.

2,775.—S. C. Granger, of Chicago, Ill., for Improvement in Preparing Mash for Brewing:

I claim the combination of common malt, crushed raw indian corn or indian corn meal and pulverized or granulated carbonized z major and water in the mash for brewing ale, beer and porter, substantially and for the purposes, as described.

2,776.—Kendall Gibbs, of Berwick, Maine, for Improvement in Cattle Fastenings:

I claim the swivel shackle and attached ring, or their equivalents, in combination with the neck rope and button, substantially as described.

2,777.—R. K. Hawley and W. W. Maughlin, of Baltimore, Md., for Improvement in Portable Wooden Tents:

We claim the construction of a wooden tent, substantially in the manner and for the purpose described, the same consisting in the combination of the gables, constructed and united as shown, with the side pieces and ridge pole, to receive a roof, in the manner specified and represented.

2,778.—R. P. Henry and G. W. Fox, of Akron, Ohio, for Improvement in Tombstones:

We claim the shield, C, lock, M, and catch, J, in combination with the stone, A, when arranged and applied, to the purposes set forth.

2,779.—J. G. Holt, of Chicago, Ill., for Improvement in Casting Seamless Screw Nuts:

I claim, first, A seamless screw-threaded sand core, the seamless thread being on the outer circumference of the sand core, for the purpose set forth.

Second, The production of nuts and other tubular articles, with a seamless screw thread on their inner circumference, from seamless screw-threaded sand cores, substantially as set forth.

2,780.—R. W. Huston, of Providence, R. I., for Improvement in Stove Cover Lifters:

I claim the described article of manufacture, constructed and used in the manner and for the purpose specified.

2,781.—Anthoni Iske, of Lancaster, Pa., for Improvement in Fire-Escape Ladders:

I claim, first, The independent ladders, five or more in number, suspended by their upper ends, on pivots, between the elevating cross levers, one above the other, successively narrowed, with their stay catches, x x, in combination with the rope, v', attached in the manner and for the purpose specified.

Second, The truss or supporting frame, B, with its jointed side pieces, E F, when the same is held on pivots, o, between or inside of the frame, A, of the hose carriage, with the reel, Y, operated by means of the windlass, D, and by straps, d, or their equivalent, for the purpose of inclining the ladders, in the manner and for the purpose specified.

2,782.—Ira Leonard, of Lowell, Mass., for Improvement in Railroad Chairs:

I claim, first, A wrought-iron suspension chair, constructed of one piece, with an elastic or U-shaped sustaining rib under the rail, for the purpose, substantially as described.

Second, In combination with a wrought-iron suspension chair, having an elastic-sustaining rib, I claim the wooden cushion, E, or equivalent, for the purpose and substantially as described.

2,783.—H. F. Mann, of Laporte, Ind., for Improvement in Breach-Loading Ordnance:

I claim, first, The combination of the oscillating cannon, A, slotted bracket, E, and crank shaft, F, the whole arranged and operating in the manner and for the purpose described.

Second, The combination of the longitudinally-sliding breech piece, C, with or without a sharp edge, stirrup, B, screw, D, or its equivalent and oscillating cannon, A, the whole arranged and operating, substantially in the manner and for the purpose described.

2,784.—S. L. Marsden, of Westville, Conn., and S. R. Burrell, of New York City, for Improvement in Candlesticks:

We claim a portable candlestick, formed of a metal socket, A, and a spike or screw, B, or a spike and screw combined, substantially as described.

[This invention consists in having a metal socket of sufficient dimensions to hold a candle, provided with a spike or screw, or both combined, so that the socket may be readily secured to any wood work, such, for instance, as the center pole of a tent, the frame of a window, or any frames arranged specially for them.]

2,785.—A. R. Miller, of Attica, N. Y., for Improvement in Carriage Springs:

I claim constructing elliptic springs with double bearings, b b, and leaving the cente thereof detached from the axle and spring bar, substantially in the manner and for the purposes shown and described.

2,786.—John M. Muller, of Richmondville, N. Y., for an Improved Process of Tanning:

I claim the employment or use, for the tanning of leather, of tansey, in combination with hemlock or oak bark, substantially as set forth.

[This invention relates to an improvement in tanning leather, whereby the work may be very expeditiously done, and leather of a very superior quality produced.]

2,787.—John Mulvaney, of New York City, for Improvement in Lamps:

I claim the employment or use of perforated or wire-cloth disks, a b, in the tube, C, and air or draught chamber, B, of a camphene lamp, when said disks are used in combination with the glass chimneys, I, provided with a lower globe portion, c, and without the ordinary draught cone, J, which encompasses the upper part of tube, O, substantially as and for the purpose set forth.

[This invention has for its object the converting of ordinary camphene lamps into coal-oil lamps by an extremely simple and economical modification.]

2,788.—O. H. P. Orendorff, of Bloomington, Ill., for Improvement in Portable Field Fences:

I claim making the panels of a portable fence in such a way that the end ports thereof shall set back from the end of the rails, leaving the ends of said rails projecting past the posts a short distance, thereby forming an angle into which the end of the adjoining panel may enter, then uniting the panels by inserting the end of one panel into the angle formed as described, and fastening the panels when thus united by hooks and staples attached to the same, the whole being constructed and arranged as and for the purpose described.

2,789.—C. E. Paxson, of Salem, Ohio, for Improvement in Corn Plows:

I claim the fenders, B B, hinged forked bars, C C, hinged handles, D D, with the guard, F, and draft beam, A, when combined, arranged and operating in the manner described.

[This invention is designed for cultivating in between rows of corn, and it consists in a peculiar construction and adjustment of parts whereby the implement is brought under the perfect control of the operator, and adapted to follow and cultivate with equal facility opposite sides of two straight or crooked rows at one operation.]

2,790.—B. D. Pease, of Madison, Pa., for Improved Butter Worker:

I claim the combination of a rotating bowl, B, with a rotary beater, E, formed of radial wings or blades, g, the outer edges of which are parallel with the inclined or concave bottom, i, of the bowl as and for the purpose set forth.

I further claim attaching the guard or fender, G, to the device by means of eyes, m m, fitted on vertical rods, n n, at the upper part of the upright, c', in connection with the key, E', for securing the jour-

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nal of the shaft, D, in its bearing in upright, c', whereby the guard or fender, shaft, D, and beater, E, may be readily detached when necessary for cleaning purposes.

[This invention consists in the employment or use of a horizontal rotating bowl, in connection with a rotary heater, arranged in a novel way to effect the desired end.]

2,791.—J. D. Potts, of Pittsburgh, Pa., for Improvement in Retrackers for Railroad Cars:

I claim, first, The construction of the adjustable track or retracker, inclined, and resting on and secured to a horizontal base, substantially as described to operate in the manner and for the purposes set forth.

Second, I claim the device of points on the under side of this base, whereby the track can be secured in any position desired, by forcing said points into the ties, or other wooden support of the rails, either by bringing on the adjustable track the weight of the car or engine to be put on, or by other means.

Third, In retrackers constructed substantially as described, I claim the combination of inclines and levels, whereby when the wheels are brought thereon, they are so moved that the wheel lying entirely outside the rails has its flange first lifted above the rails of the road, and then gradually lowered, so that it touches said rail; and that the wheel, lying between the rails, has its tread raised above the rail of the road, and then gradually lowered on to said rail, and by the action of its own gravity, guided by the incline, is forced towards said rail, thus bringing its own and the tread of the opposite wheel into their proper positions on the track, and placing the two wheels as nearly simultaneously as possible on their proper rails.

Fourth, I claim the arrangement whereby the flanges of the wheels are guided by coming against the sides of the retrackers to the track on which they are to be placed.

Fifth, I claim the lip which, by projecting over the rail of the road, prevents the flange of the wheel from going between said rail and the adjustable track.

Sixth, I claim the arrangement whereby each of the two adjustable tracks, constituting a set, is arranged so that it can be used for either wheels between the rails, as is required.

Seventh, I claim the devices whereby the incline and base are united, as shown.

2,792.—A. D. Puffer, of Somerville, Mass., for Improvement in Soda Fountains:

I claim passing the pipes which convey the soda and sirups to the draught cock, within the trough, F, where they are cooled by the water from the melting ice, as set forth.

Second, The arrangement within a single draught stand of the compartments, B C and D, all in contiguity with the central cooler communicating with each other by the air passages, h, and closed by tight-fitting plugs, z, whereby, while the sirups are kept separate they are all ejected by the operation of the same force pump, as set forth.

2,793.—W. F. Quinby, of Stanton, Del., far Improved Apparatus for Navigating the Air:

I claim, first, The employment, in combination with the boat-like car, of oscillating wings, A d d, constructed and applied to operate substantially as and for the purpose set forth.

Second, The combination of the wings, A d d, the screw propeller, C, and the spiral-bladed wheels, I I', the whole operating together substantially as and for the purpose specified.

2,794.—J. W. Shipman, of Springfield Center, N. Y., for Improvement in Presses for Hops, Hay, &c.:

I claim the combination of the cam piece and socket, H', and toggles, I I, with the box, F, hinged rack bar, E, and bars, D D, as shown and described.

[The object of this invention is to obtain a press of simple construction, which may be operated manually and with great facility for compressing substances for baling.]

2,795.—Philander Shaw, of Boston, Mass., for Improvement in Hot-Air Engines:

I claim, first, The combined arrangement in a caloric engine, operating substantially as shown and described, of the cylinders, pistons, reservoir and furnace. The cylinders and their accessories acting together to rotate one shaft, and the cylinders being located partly within and partly without the reservoir which contains a supply of compressed and heated air, and a furnace which heats the said supply, which, with the gaseous products of combustion, passes through the engine.

Second, The combination of the finished or upper part of the cylinder, with its head, piston and trunk therewith connected, all operating together, substantially as described, and with inlet and outlet valves, and suitable packing round the said trunk, to form an annular air pump.

Third, The chamber or groove around the cylinder, arranged and operating substantially as specified, at or near where the lower part of the piston comes at the termination of its downward movement.

Fourth, The isolated oil trough within the chamber or groove around and within the cylinder, for the specified purpose.

Fifth, The inwardly projecting flange, s, arranged and operating substantially as shown and described.

Sixth, Admitting into the cylinder comparatively pure and cool air, from a reservoir in which it is constantly maintained compressed, at the place and times and by suitable valve gearing, substantially as and for the purposes specified.

2,796.—Suspended.

2,797.—J. H. Shotwell, of Rahway, N. J., for Improved Air-heating Apparatus for Engine Furnaces:

I claim the combination of the steam passages, e, with air passages, f, and water passages, g, combined, arranged and operating in the manner and for the purposes set forth.

[This invention consists in a simple apparatus for heating air for supplying the fires of a steam boiler and furnace, and also for heating air for warming buildings, whereby great economy is effected in the saving of fuel.]

2,798.—Henry Sidle, of Dillsburg, Pa., for Improvement in Churns:

I claim the combination of the fillets or cleats, f, with the dashes, I and G, when the whole are arranged and constructed to operate in the manner and for the purposes described.

2,799.—Joseph Stewart, of San Francisco, Cal., for Improvement in Maneuvering Heavy Guns:

I claim the combination of the shaft, S, and rope or chain, D, with the inclined chassis, A, and gun carriage, B, substantially as described, and for the purposes and uses as set forth.

2,800.—J. A. Strong, of Hyde Park, Vt., for Improved Self-Waiting Table:

I claim providing the self-waiting table, B G D, with a stationary central part, C, adapted to support dishes, lamps, or the like, and supported by a spindle or neck of less diameter serving to guide and retain the annular revolving part, D, substantially as and for the purpose set forth.

2,801.—Rollin White, of Davenport, Iowa, for Improvement in Cartridges:

I claim, first, The construction of the case of a cartridge of two or more pieces of metal movable longitudinally relatively to each other, substantially as and for the purpose specified.

Second, So constructing the cap or pellet, g, containing the percussion priming, and applying the same to the base of the cartridge that it will be caused to operate as a valve to close the vent thereof by the force of the explosion of the charge.

Third, Fitting the percussion cap or pellet, g, to a shoulder, i, formed around the vent in the base of the cartridge case, substantially as described, for the purpose of a firm bearing, to support the said cap or pellet against the blow of the hammer, and so insuring the explosion of the priming.

2,802.—J. W. Whittier, of Cambridge, Mass., for an Improvement in Fastening Window Blinds:

I claim the levers, B and D, the notched rest or support, A, and the plate or catch, A, constructed, combined and arranged as and for the purpose above set forth.

2,803.—A. J. Wiley, of South Attleborough, Mass., for an Improvement in Making Joint Wire or Stock for Jewelry:

I claim the making of joint wire or joint stock from one piece metal, as described, and

I claim making the said joint wire or joint stock, substantially in the manner shown and described.

2,804.—I. F. Williams, of New York City, for an Improved Machine for Applying Flocks to Felt Rubber Goods:

I claim, first, The arrangement of the gumming table so as to be an incline plane, as described, in combination with a self adjustable gum distributor, for the purposes set forth.

Second, I also claim the use of throat, F, and smut collector. G, or equivalent devices, in the sifter case, as a method of preventing masses of falling flock from smutting the cloth, substantially as described.

Third, I also claim the use of swinging arms or beaters, h3, in combination with the revolving beaters, H, substantially as described, and for the purposes set forth.

Fourth, I also claim the use of the cloth tension roller, I, in combination with the carrying roller, K, at the back end of the machine, arranged on a line below the revolving beaters, while the roller, I, is arranged on a line above the gumming table, so as to support the cloth on these two points, and thus prevent the blows of the beaters drawing or jerking the cloth over the surface of the gumming table.

Fifth, I also claim the combination of the finishing brush, J, with the revolving beaters, substantially as described.

2,805.—S. D. Woodbury, of Lynn, Mass., for an Improvement in Elastic Carriage Wheels:

I claim rendering a carriage wheel elastic, by making the felly in two concentric parts, F and f, and interposing a belt, or layer, of India rubber, or other elastic material, R, substantially as described, and for the objects specified.

2,806.—G. F. Blake, of Medford, Mass., assignor to Himself and Peter Hubbell, of Charlestown, Mass., for an Improvement in Machines for Pulverizing and Cleaning Clay:

I claim, first, In combination with a machine for cleaning and pulverizing clay, the reciprocating wipe or plunger, W, constructed and operating substantially as described.

Second, The revolving grate, constructed and operating as described.

Third, The stationary fingers, w, constructed, arranged and operating as set forth.

2,807.—S. E. Bolles, of Mattapoisett, Mass., assignor to Himself and Thomas Ellis, of Rochester, Mass., for an Improvement in Carriage-Pole Supporter:

I claim my improved carriage-pole supporter, having its several parts constructed and arranged in relation to each other, and so as to operate together, substantially as shown and described.

2,808.—R. G. Holmes, of Worcester, Mass., assignor to Himself and Jonathan Luther, of the same place, for an Improved Clothes Washer and Wringer:

I claim the arrangement of the guides, J, with the roller slides, H, rollers, G, springs, I, and bar, K, as shown and described.

[This invention relates to an improvement in that class of clothes wringers, in which elastic pressure rollers are employed for exhausting the moisture from the clothes.].

2,809.—William McCord, of Sing Sing, N. Y., and Edmund Maher, of New York City, assignor to William McCord aforesaid, for an Improvement in Repeating Ordnance, &c.:

We claim, first, Embracing and holding the cartridge chambers, O, opposite the gun barrel, B, by means of the oscillating and reciprocating jaws, C' D, constructed, combined, arranged and operating as described.

Second, We claim the employment of the bars, L, and segment of a cog wheel, M, on the oscillating jaw, C', and slide, N, with cogged rack on its lower surface, and a ridge on its upper one, for throwing off from said jaw, C', the exploded cartridge chambers, and admitting loaded ones singly from the hopper, as set forth.

Third, We claim the peculiar form of the opening or space, D3, in the reciprocating jaw piece, D, in connection with the crank, E', by which the necessary stoppage is given the said jaw piece at the end of every reciprocal throw of the same, as fully set forth.

Fourth, We claim covering the nipple ends of the cartridge chambers with a cap, P, having a headed or valve pin, P', working loosely in an opening immediately opposite the percussion cap on the nipple, substantially in the manner and for the purpose set forth.

2,810.—J. D. Owen, of Carlinville, Ill., assignor to Himself, E. L. Owen and G. W. Barnett, for an Improvement in Post-Hole Excavators:

I claim the combination of the cylinder, a, the follower, D, and the rod, c, when constructed and arranged substantially as described for the purpose of excavating holes for posts.

2,811.—R. H. Peck, of Wolcott, Vt., assignor to Himself and E. Gifford, of Cady's Falls, Vt., for an Improved Churn:

I claim the combination and arrangement of the frame, A, adapted to receive the tub, with its frame work, C, the crank shaft, H, and its gear wheel, G, mounted thereon, the tub, B, the upright revolving dasher, E e, with its gear wheel, F, the cross piece, a, and the hanged cap, I, the whole operating together in the manner and for the purpose described.

2,812.—Francis A. Pratt, of Hartford, Conn., assignor to G. S. Lincoln & Co., of the same place, for an Improvement in Stopping and Changing Motion:

I claim adapting the action of the levers, e e', to the rim of a pulley, D, in combination with the wedge collar, 1, substantially in the manner as and for the purpose described.

2,813.—S. D. Tucker, of Troy, N. Y., assignor to C. S. Sill, of the same place, for an Improvement in Cording Guides for Sewing Machines:

I claim, first, The arrangement of the lower outside guide, F, with the bending shell, A, core, B, and two inside guides, C D, as and for the purpose specified and shown.

Second, The arrangement of the cord-guiding aperture, e, with the bending shell, A, core, B, inside guides, C D, and lower outside guide, F, as and for the purpose specified and shown.

Third, The arrangement of the upper outside guides, G, with the bending shell, A, core, B, and two inside guides, C D, as and for the purpose specified and shown.

Fourth, The arrangement of the cord-guide, e, with the bending shell, A, core, B, inside guides, C D, and upper outside guide, G, as and for the purpose specified and shown.

Fifth, The arrangement of the two outside guides, F G, with the folding shell, A, core, B, and two inside guides, C D, as and for the purpose specified and shown.

Sixth, The arrangement of the cord-guiding opening, e, with the bending shell, A, core, B, two inside guides, C D, and two outside guides, F G, substantially as and for the purpose specified and shown.

Seventh, The arrangement of the cloth-passage, h, in the upper side of the folding shell, A, as and for the purpose specified and shown.

RE-ISSUE.

J. S. Smith, of New York City, for an Improvement in Epaulets. Patented April 12, 1859:

I claim the construction, arrangement and combination of epaulets, substantially as described, the same consisting of the following three elements combined:—

First, A shell, or epaulet proper, with its usual appliance or appliances for its attachmeet to the coat:

Second, A bullion, or fringe, permanently attached or secured to a frame, plate or what is termed an adjuster, and

Third, A mechanical device for holding the said frame, plate or adjuster whithin the shell, substantially in the manner and for the purposes set forth.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

BACK NUMBERS AND VOLUMES OF THE SCIENTIFIC AMERICAN.—Volumes I., II. and III. (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1.50 per volume. by mail, $2—which includes postage. Price in sheets, $1. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

Notes and Queries

A. J. B., of Nebraska.—There are no very good works published on the distillation of coal oils. Balliere Bros., of this city have published a work on coal oils, which is the best we know of

W. H. L., of N. Y.—The *American Railway Times* is published in Boston. The new steamer *Constitution* is now in the transport service of the government, and, we presume, will not go to California for some time.

T. R. B., of Mass.—"Nicholson's Cyclopedia" is a good work on mechanics and natural philosophy. Ure's Dictionary is a good work on the mechanic arts.

C. H. M., of N. Y.—In relation to joining the Cavendish Society, consult either personally or by letter Balliere Brothers, No 440 Broadway, N. Y.

C. P. W., of N. J.—The bore of a 6-pounder cannon is 3.668 inches. Dahlgren's shell guns are made of 8, 9, and 11 inch bore. Parrott makes his guns of various sizes.

D. B. D., of Ohio.—In reference to the study of mathe- matics we cannot give you any advice, but would refer you to some one of the many competent teachers in your city.

A. W. H., of C. W.—We do not know where machinery for making wooden bowls can be obtained. We presume that some one who sees this notice will advertise such machinery in this journal.

S. M., of Pa.—We are unable to give you any information in regard to the Saurpetoe blacking.

S. B., of Pa.—The suggestion you make in reference to the use of shells filled with noxious gases to operate against forts, is not a new one. This project has been frequently broached—but if you can accomplish anything practically valuable, your best plan will be to lay it before your member of Congress, and obtain his aid in getting you before the proper Department. We cannot afford you any assistance in this respect.

O. P. A., of N. H.—For information about brass belting address the Waterbury Brass Company of this city.

E. H., of ——.—Collodion is a solution of gun cotton in a mixture of alcohol and ether. It is composed of the four organic elements, oxygen, hydrogen, nitrogen and carbon, but as it is not a definite chemical compound, the proportions vary. The manipulations are so delicate, and the conditions so essential, that practical instruction is necessary to enable one to make it.

A. E. F., of Pa.—We do not approve of your plan for the general government to take charge of the subject of education. As a general rule the State governments are better adapted for the conduct of local affairs than the Federal government, and it would be impossible for the latter to compel the former to maintain common schools. The laws on this subject in the Northern States could not be enforced without the sanction of public opinion. You might as well pass a law prescribing to people what they should eat.

J. R. P., of Ohio.—We have received no information re- specting experiments with rifled howitzers. Gun cotton has been used for exploding shells, and we believe it is very suitable for this purpose.

W. A. S., of Ohio.—There are many manufacturers of acetic acid from low wines in New York and its vicinity. You will find the process of making it described and illustrated on page 247, Vol. 4 (new series) SCIENTIFIC AMERICAN.

M. R. C., of Mass.—Sheet tin has never been manufactured in America. All that we use is imported from England. You will find the process described on page 116 of our present volume.

U. B., of Pa.—You have indeed made the improvement whereby gun carriages may be constructed to suit the tracks of railways and run upon them. It will be very difficult, however, to obtain a change in the construction of gun carriages, whereby their cost will be increased and their construction rendered more complex

C. I., of Mass.—We could not recommend rotten stone to be applied to the teeth daily to keep them clean; once a week would be sufficient, as its frequent applicatian will tend to injure their enamel. The information desired about the National Hymn we cannot give.

R. G. B., of Pa.—A cannon constructed with successive charge chambers to give the shot successive impulses as it passes along the barrel, is not new. We do not know whether its range is much greater than that of common guns. Mr. Lyman of this city, is the inventor of such a gun.

W. A., of Wis.—Who told you that a ball shot from a rifle held horizontally ascended above the level of the rifle? The elevation of a ball in its flight is just in proportion to the angle of the rifle.

H. B. S., of N. B.—The bright surface resembling enamel on English cutlery, is produced by steel burnishing tools, not powder. We do not know the cost of the "Encyclopedia Britanica."

QUERY.—A correspondent makes the following inquiry, "I wish to know what it is that breaks a salt pan when strong brine is being concentrated in it, and why it is that the salt don't make on the bottom?"

COMPOSITION FOR LEATHER BELTS.—A correspondent says, "Take neat's foot oil and add to it about one-third of its bulk of common resin, and stir it over a moderately warm fire until the resin is dissolved. I have found this composition very superior for lubricating the belts of machines. Several good coats of it should be applied at first."

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Dec. 4, 1861:—

O. E. M., of Ill., $25; B. & C., of Mich., $25; G. M. N., of Ill., $15; E. S., of N. Y., $25; E. & R., of N. Y., $25; C. W. B., of Conn.

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$22; B. D. R., of Iowa, $15; P. S. F., of N. Y., $20; D. & C., of N. Y., $100; B. T. B., of N. Y., $40; M. A. F., of N. Y., $20; A. B. T., of Mich., $15; C. & G., of Pa., $15; T. C. H., of N. Y., $20; B. T., of Ill., $25; J. D. C., of Conn., $15; R. P. W., of Ohio, $25; W. J. S., of Ohio, $25; C. & P., of Me., $25; R. H., of Ill., $15; E. C., of Mass., $25; A. S., of L. I., $100; J. D. P., of Iowa, $10; S. & S., of Me., $45; O. M. T., of N. Y., $20; J. T., of N. Y., $20; J. L. L., of N. Y., $20; F. C. P., of N. Y., $20; J. M., of Ill., $25; C. M. S., of Conn., $30; E. C. M., of N., Y., $28; M. T. G., of Ill., $15; E. B. Mc., of Conn. $20; E. J. H., of Vt., $28; H. K., of Pa., $25; E. A. W., of Cal., $35; W. B. F., of Mich., $15; R. W., of Conn., $10; H. & H., of Ill., $25; E. & W., of N. Y., $15; C. G. L., of N. Y., $15; C. L. G., of N. Y., $15; I. F. B., of Conn., $20; A. McG., of N. Y., $50; J. V. H., of Ill., $20; J. F. B., of Conn., $25; S. H., of Ind., $25; A. K., of Ill., $30; D. H., of N. Y., $25; J. W. C., of N. J., $25; P. D., of N. Y., $25.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Nov. 27, to Wednesday, Dec. 4, 1861:—

R. W., of Conn.; H. and H., of Ill.; C. B. T., of Oregon; M. and D, of N. Y.; E. A. W., of Cal; S. J. S., of N. Y.; P. D., of N. Y.; W. J. S., of O.; C. and P.. of Me.; C. and B., of Mich.; A. M., of O.; C. O'H., of Eng.; R. P. W., of O.; E. S., of N. Y.; E. C. of Mass.; E. and R., of N Y.; S. and S., of Me.; N. P. E., of N. J.; A. K., of Ill.; J. W. C., of Mass.; E. C. M., of N. Y.; B. T., of Ill.; D. H., of N. Y.; J. M., of Ill.; A. B., of N. Y.; J. F. B., of Conn.; C. M. S.; of Conn.; S. H. of Ind.; B. T. B., of N. Y.

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BLADES AND SWORDS.—SOLINGEN BLADES, THE most excellent and reliable in the world, used almost exclusively in the Prussian, English, French and our own armies, made strictly according to the U. S. patterns, for all kinds of swords and sabers required here, constantly received by every steamer, and imported to order. Blades for line officer's swords, with leather scabbards, now in store, 31 inches long, with coat of arms of U. S., eagle, &c., handsomely etched. Guaranteed to cut wrought iron, and to possess all necessary qualities of a reliable blade. All kinds of regulation swords and blades mounted with these blades. For sale by LOUIS WINDMULLER, No. 163 Pearl street, New York, sole agent for the Solingen manufacturers. 1*

MACHINERY.—S. C. HILLS, No. 12 PLATT-STREET, New York, dealer in Steam Engines, Boilers, Planers, Lathes, Chucks, Drills, Pumps; Mortising Tenoning and Sash Machines; Woodworth's and Daniels' Planers, Dick's Punches, Presses and Shears; Cob and Corn Mills; Harrison's Grist Mills; Johnson's Shingle Mills; Belting, Oil, &c. 3*etw

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AT AUCTION, IN INDIANAPOLIS, IND., JANUARY 7, 1862—Three unpatented improvements of great value, on articles in daily use everywhere. For particulars, enclose two stamps to J. B. LOGAN, Box No. 77, Noblesville, Hamilton Co., Indiana. 1*

FOR THE LONDON FAIR.—GREAT CHANCE FOR A capitalist to buy a British patent, just issued, for a new Life Boat, which may turn under a wave, leaving its inmates undisturbed. Address JOHN T. SCHOLL, Port Washington, Wis. 1*

FOR SALE CHEAP.—A NEW INVENTION. PATented for 17 years. Address A. H. TREGO, Lambertville, N. 24 2*

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NEW YORK OBSERVER FOR 1862.—IN ASKING the aid of all who may desire to extend the circulation of the *New York Observer*, it is proper for us to state distinctly the position it occupies with reference to the present condition of public affairs in our beloved country.
Having always maintained the duty of good citizens in all parts of the land to stand by the Constitution, in its spirit and letter, when that Constitution was assailed and its overthrow attempted, we accordingly at once gave a cordial support to the Government in its patriotic endeavor to assert its lawful authority over the whole land. Believing secession to be rebellion, and when attempted, as in this case, without adequate reasons, to be the highest crime, we hold
1. That the war was forced upon us by the unjustifiable rebellion of the seceding States.
2. That the Government, as the ordinance of God, must put down rebellion and uphold the Constitution in its integrity.
3. That every citizen is bound to support the Government under which he lives, in the struggle to reëstablish its authority over the whole country.
4. That the Constitution of the United States is the supreme law of the Government as well as of the people; that the war should be prosecuted solely to uphold the Constitution and in strict subordination to its provisions: and the war should be arrested, and peace concluded, just so soon as the people now in revolt will lay down their arms and submit to the Constitution and laws of the land.
The distinctive features of the *Observer* are,
I. It is printed on a double sheet, so as to make two complete newspapers, one devoted to secular and the other religious matters; and these may be separated so as to make two complete journals, while the price for both is no greater than is charged for many papers smaller than either one of the two.
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The state of the country renders it important for us and esirable for the churches, that a new and earnest effort be made to extend the principles of good government and sound religious truth into all the families of the land. In every neighborhood there must be some who do not now take a religious newspaper, and who might with a little exertion be induced to subscribe.
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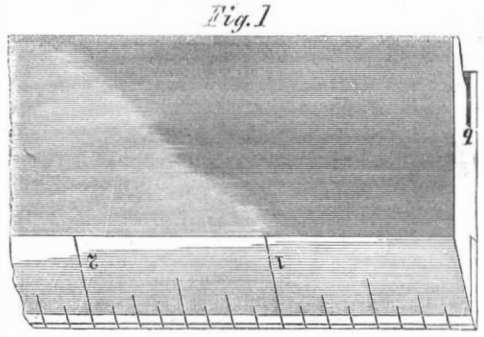
LANE'S CAPILLARY GROOVED RULERS WITH PAPER CUTTER AND RULE COMBINATION.

Among the many useful improvements and combinations which have from time to time been presented for the purpose of facilitating the manual operations of those employed at the desk, none can claim a higher place than the neat, compact and durable article here represented. Being the invention of a practical accountant of many years' experience, it is reasonable to presume that it is applicable to the different uses claimed for it. The object of this improvement in the ordinary flat ruler, is to effectually prevent the ink from blotting the paper, by the introduction of one or more fine grooves, *b*, which, acting

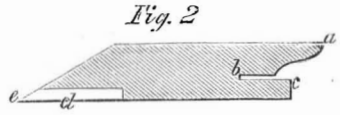
Fig. 1



by the law of capillary attraction, absorb horizontally all ink that may descend from the edge along which the pen passes, *a*. The groove may, if preferable, serve the purpose of holding a narrow strip of blotting paper, which, extending and resting on the projection, *c*, will absorb the ink in its descent. The latter may appear the better arrangement to those unfamiliar with the action of capillary grooves, but the former will be found to be equally effectual.

A further improvement consists in the attachment of a paper cutter, *d*, on the under side and opposite edge of the ruler, and beveled with the same to a sharp edge, *e*. This beveled surface is marked as a graduated scale or rule, similar to that in use by draughtsmen. The paper cutter, combined as it is with the ruler, is in a very desirable form, can be handled readily, is true, and not liable to become bent and disfigured like the ordinary tin cutters. The rule or scale is serviceable in various ways to the book-keeper for dotting off the distances for ruled lines, ornamental work, giving orders to the stationers, &c. For the use of schoolboys its advantages are

Fig. 2



particularly apparent, as by placing this article in the hands of the pupil, a taste for mathematical accuracy may be cultivated, which is so beneficial in many pursuits of life. This subject has often engaged the attention of those connected with educational interests, and we are pleased to record any invention which has for its object the encouragement of this important branch. A rule or scale should be in the hands of every scholar, and it would seem that Lane's Rulers, conducing as they do to neatness and cleanliness, beside combining three useful and practical articles in the space of one only, are destined to displace to a considerable extent in our counting-rooms and schools, all other rules and cutters. Although but a few months since patented, the inventor has received flattering testimonials of their merits from many of the first accountants and teachers in this and other cities. This improvement in rulers was patented, June 18, 1861, through the Scientific American Patent Agency. Any further particulars may be obtained by addressing the inventor, George Lane, Cashier with Lathrop, Ludington & Co., No. 25 Park-place, or of the wholesale agent, Porter Fitch, No. 3 Park-place, New York city.

It has been stated that the American Indians, and after them the Germans, are the most celebrated for long "jaw-breaking" names, but some chemists are a match for them both put together. One has lately given the term "methylethylamylophenyl ammonium" to a preparation of "wood spirits" and ammonia.

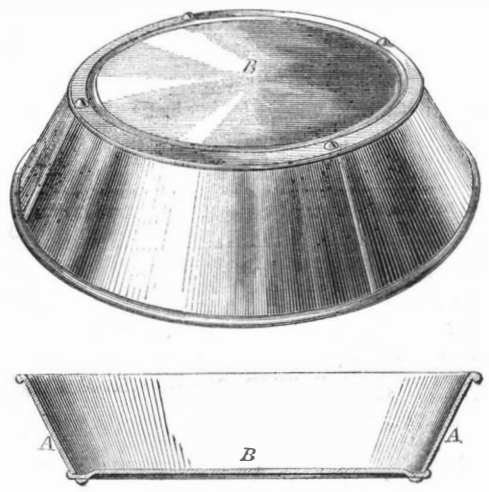
SPAULDING'S IMPROVED MILK PAN.

It is a well-known fact to all workers in tin, that in making a large pan or pail which needs to be watertight, the heat in the soldering process expands the bottom, no matter how well put on, causing considerable slackness, which remains after the heat is dissipated. This slackness is really a sort of wrinkling, which allows the bottom to spring when pressed, or when the pan is filled, and has more or less irregular angles, which of necessity come in contact with the table or shelf on which the pan is set, and are soon worn through, rendering the dish useless. This is peculiarly the case with the milk pan, and the larger it is the more serious is the defect.

A remedy has been found, however, in the invention here illustrated for which a patent was granted to Charles F. Spaulding, of St. Johnsbury, Vt., July 23, 1861.

A A are the sides, and B B the bottom of a milk pan made and soldered in any of the ordinary methods. By means of a roller properly constructed for the purpose nearly the whole of the bottom is raised sufficiently to take up all the slackness, and the result is a beautiful dish with a symmetrical concave bottom, drum-head tight, and, when the usual solder drops or legs, are put on, no where else touching the shelf or other support on which the pan may rest.

Thus constructed this pan will last double the time of the ordinary one; but this is not its only recommendation. Dairymen know that—other things being equal—a greater quantity of cream will be collect-



ed on the surface of milk around which the air is allowed to circulate freely, and which has not been disturbed during this collecting process. Both of these conditions are obtained by this invention, as the pan when full may be moved without having the milk disturbed by a springing bottom, and there is clear space of some eighth of an inch or more under the pan, between it and the shelf, for the circulation of the air.

The expense is but a mere trifle above that of the ordinary milk pan, and the disk roller for the raising of the bottom can be correctly and cheaply attached by any common machinist to Burton's double seamer, already in use among many tinmakers; or a machine for the purpose will be furnished by the owner of the patent at a price not exceeding $10.

Further information can be obtained by addressing Lorenzo K. Quimby, Lyndon, Vt.

One of the most extraordinary salt wells on record, perhaps, is now in operation at Wellsville, Ohio. The well was sunk in anticipation of finding oil, but when at a depth of four hundred and eighty feet the borers struck a vein of gas, which burst forth with such violence as to eject all the tools used in boring, together with two hundred feet of pipe which had been previously introduced. The boring had developed a very strong vein of salt water, which yields a barrel of salt an hour.

The Seneca Knitting Mills at Seneca Falls, in this State, now engaged on government contracts, employ between three and four thousand men and women, and yet this force is inadequate to meet the demand. Orders for many thousands of pairs of stockings have been turned away. The company have ordered a large amount of new machinery, sufficient to increase the capacity of the mills at least one-third.

Musical Sound Resulting from Echoes.—In the *Cosmos* is a notice of M. Fabri's experiments, showing that it is possible to produce a musical tone of echoes which succeed each other very rapidly. By placing himself between two walls parallel with each other, and distant about eight yards, and producing any sound at distinct intervals, he has determined that the reflexions or successive echoes of this first sound, rebounding from the walls, are sent from one wall to the other, giving rise to a musical tone which lasts some time. Knowing the velocity of the sonorous waves, he was able to calculate the number of vibrations which corresponded to this sound, and he found an agreement between the result of this calculation and direct observation. The fact is curious enough, because the intensity of individual sounds, which, by their frequent addition, ought to form the musical sound, becoming more and more weak, it was hardly to be expected that they could combine into one and the same sound.

"The Great Eastern."—The London *Engineer* says that the Great Ship Company have resolved to issue £22,000 of 10 per cent second mortgage debentures to fit out the Great Eastern for a new voyage. The repairs are estimated at £8,000 ($40,000) only, and will be, it is said, provided for out of assets in hand.

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